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Organize & Clean Your Data Center

Steps You Can Take To Keep It Clear Of Messes, Obstructions & Other Issues

Whether it's moving a few cables for better management or changing the layout of your data center, there are many ways to improve organization and prevent messes or potential outages related to an inefficient design. Here are some things you can do.

Develop A Master Floor Plan

Look at your data center layout, discover potential issues, and then build a master floor plan to clear up those issues. A master floor plan and the correct configuration of equipment, cooling systems, and other solutions will result in a nicer looking data center and leave enough room for employees to move around.

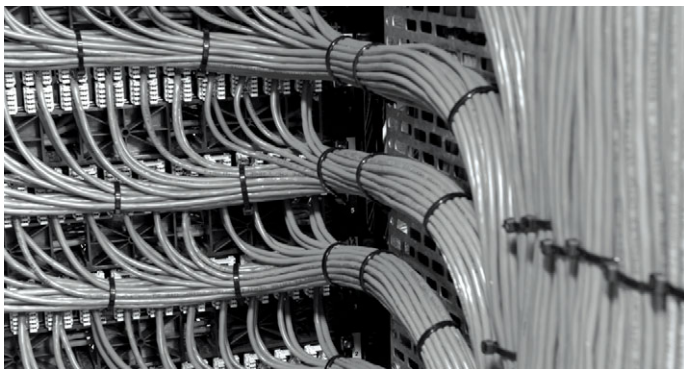
Improve Cable Routing & Management

"When trying to organize a messy data center, the first step is to determine what style cabling topology you have or desire and then select the appropriate equipment to support it," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net).

For instance, Viars says if you have a distributed, in-cabinet switching topology, you will need to focus on cable tray and internal cable management for your switch cabinets. The best approach depends on your specific layout and environment.

In some cases, you may want to consider implementing new cable management practices or even software solutions that can aid in cable routing.

A cable management plan should make deployment fast, easy, and scalable, says Ken Koty, sales engineer at PDU Cables (866/631-4238; www.pducables.com). "A well-organized cable-management system also improves security by limiting human error when working with cables and improved airflow and cooling allowing for higher densities," he says.



Top Tips

Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net), offers the following tips for improving the organization of your data center:

Research your topology. You'll want to make sure you are using a topology that works best for your needs. Don't forget to factor scalability, manageability, and growth into your plan for reorganization.

Plan your new layout. Even if you're just reorganizing or modifying your layout, get a firm plan in place.

Plan your time. Determine the time frame required to make the modifications—and be generous.

Plan Ahead & Don't Rush

Make sure you have a well-formed plan when updating the layout of your data center or moving locations. This is an opportunity to learn from experience and decide if your current configuration is the best. And it's also an opportunity to look for possible organizational issues, head them off at the pass, and put your data center in a much better position for the future.

Darin Stahl, lead research analyst at Info-Tech Research Group, says you can improve your overall data center organization by adjusting your business processes and how you handle implementations and changes.

To help avoid disorganization due to rushed implementation, he says companies should "commit or recommit to strict change policies" and focus heavily on the consequences of not giving your IT team enough time to make changes.

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NEW! Newsstand

A Big-Picture View Of Both Power & Environmental Data

Server Technology Sentry Power Manager 5.3 Provides A Central Spot For The Information You Need

Data center infrastructure management tools are great for providing a holistic view of a data center. But not every enterprise needs a DCIM tool.

As Calvin Nicholson, senior director of software and firmware development at Server Technology, says: "What happens if you're just concerned about your power and environmental monitoring, which a lot of people are, and don't really need a full DCIM solution?"

In those cases, a tool such as Server Technology Sentry Power Manager is just what they need, Nicholson says.

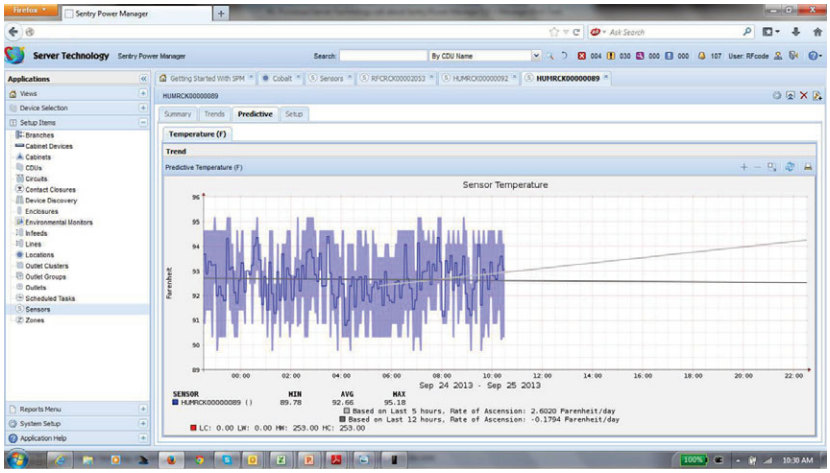
Making Data Usable

Server Technology SPM is a DCIM-type tool for monitoring and reporting on the information gathered by the PDUs installed in your data center. Unlike with some other tools or manual processes available, SPM sits above the PDUs, Nicholson says, auto-discovers them, and brings all the data into one location. "SPM takes the power information and makes it usable," he says.

Version 5.3 is the result of Server Technology's engineers working to update and improve the product, Nicholson says.

Environmental, Too

One of the greatest improvements with version 5.3 is the ability to integrate and report on data gathered by environmental sensors from RF Code. Although customers can get sensors for temperature, humidity, and water from Server Technology and monitor to ASHRAE standards, RF Code offers additional sensors, such as those for pressure and airflow.



Sentry Power Manager offers predictive temperature trending.

"These sensors are fairly inexpensive," he says, "and RF Code sensors can now export information into SPM so data center managers can get all the power- and environmental-related information in one location." With the integration of RF Code and Sentry Power Manager, companies can monitor a large and diverse set of power and environmental information, he says.

A Complete View Of Power

The latest version includes a number of other updates, including support for PDUs offered by more competitors. Version 5.3 also adds the ability to create custom device templates, which essentially let you communicate with, track, and report on any SNMP-enabled device such as a UPS or RPP. Using these templates, you can take a number of PDUs and group them by cabinet to create a zone. SPM tracks the power capacity and trending information for both the zone and SNMP-enabled device.

"It's a pretty powerful tool," Nicholson says. "We're monitoring at the cabinet and now we can compare that against upstream infrastructure."

With the new integration of RF Code environmental sensors and the ability to track and monitor power information from any SNMP-enabled device, Nicholson says any data center that has 25 or more PDUs really needs Sentry Power Manager.

"Not only can we do capacity planning and run reports, we can also help with firmware upgrades and configuration of units," he says. "If you're worrying about capacity, planning for an upgrade, or just need an understanding of how your infrastructure is growing, SPM can give you an idea of what's happening."

Server Technology
Sentry Power Manager 5.3

Server Technology
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A single system for monitoring and reporting on the information gathered by PDUs installed in your data center. Version 5.3 has a number of updates, including the ability to track data gathered by environmental sensors from RF Code.

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FEATURED PRODUCT

Easy Labeling On The Go

Brady BMP®41 Portable Printer Offers Both Die-Cut & Continuous Labels For Use In A Variety Of Datacomm & Electrical Applications

Anyone who has spent time labeling cables, patch panel strips, faceplates, or other equipment knows what a hassle it can be. You print the labels, cut them, and make sure they stay in sequence only to get to a job site and find out you've forgotten or lost a label or smeared the printed text.

It's those types of headaches that the Brady BMP®41 portable label printer helps avoid.

The printer is unique in its ability to print both continuous and die-cut labels, says Matt Luger, Brady's regional product specialist for printers.

The BMP41's ability to print die-cut labels that are pre-cut and pre-spaced inside a cartridge eliminates the time- and money-wasting issues associated with continuous printers while still offering continuous labels for certain applications.

The printer can handle any labeling need, including flags, wraps, strips, and small labels for both indoor and outdoor use. And it is easy to use—it automatically recognizes the label installed and defaults to the correct rotation, format, size, and font, with the ability to override any default settings.

Rubber guarding, bumpers, and a grab-and-go grip ensure the BMP41 can handle field and mobile use, including drops and bounces. An optional magnet easily attaches to the BMP41, so users can affix the printer to a metal cabinet or panel.

Brady offers the BMP41 without the expensive investment typical of other die-cut printers. It costs just $299, including the printer, long-life NiMH battery, charger/AC adapter, one label cartridge, and a USB cable.

"Never before has there been a printer at a sub-$300 price point that allowed users to get this full, robust set of labeling capabilities and labeling muscle," Luger says. P

Brady BMP®41

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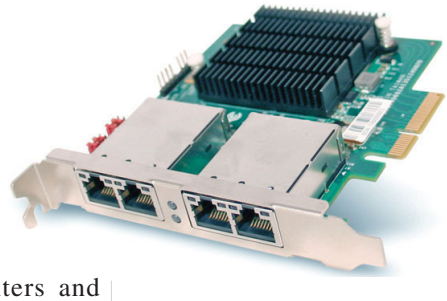
Portwell BPC-51242 & BPC-51120 Are Ideal For Any Systems That Demand High Availability Or Additional Network Ports



Up-to-date technology and peace of mind from long life cycle support. Those are two of the greatest benefits you get from products offered by Portwell, and its newest network adapters with cost-effective bypass design are no exceptions.

The Portwell BPC-51242 (pictured) is an Intel I350-AM4-based quad-port copper Gigabit Ethernet adapter with a PCI-E 2.0 interface.

Support for PCI-SIG SR-IOV makes the BPC-51242 ideal for high-end server appliances and virtualized environments as it reduces the latency of network I/O in a virtualized environment.

The BPC-51242 features integrated bypass relays in the connectors. They are easy to maintain and service and can be set to Normal or Bypass mode or enabled or disabled via jumpers and software. A built-in, standalone Watchdog Timer monitors your inline appliances and can automatically bypass the Ethernet ports when the host system loses power or fails for any other reason.

The other new product in Portwell's lineup, the dual-port BPC-51120, is ideal for enterprise data centers and high-performance computing.

It utilizes an Intel Ethernet controller I210 with a 1000Base-T interface. The I210 controller supports Audio-Video Bridging, which guarantees bounded latency and latency variation for time-sensitive traffic. An energy-efficient design, backed by the Energy Efficient Ethernet standard, ensures that the switch powers to a low power idle state during periods of low network activity.

The low-profile BPC-51120 has a PCI-E 2.0 interface and uses Portwell's Generation 3.0 Bypass function, with support for Normal, Bypass, and Open modes in case of a system crash or power failure. P

Portwell BPC-51242 & BPC-51120

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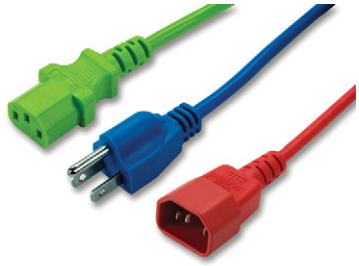

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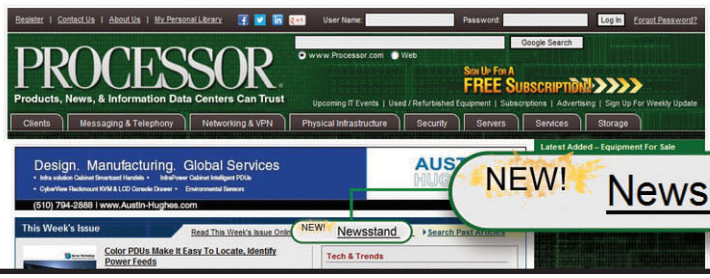

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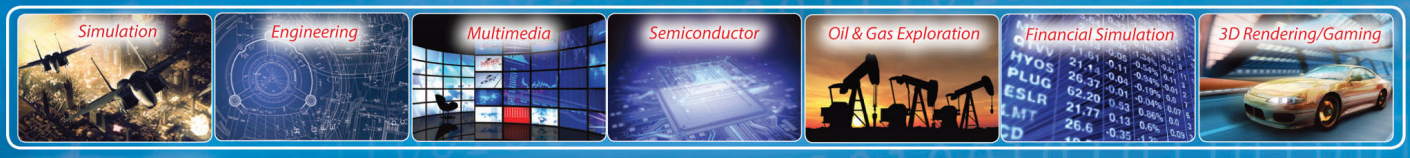

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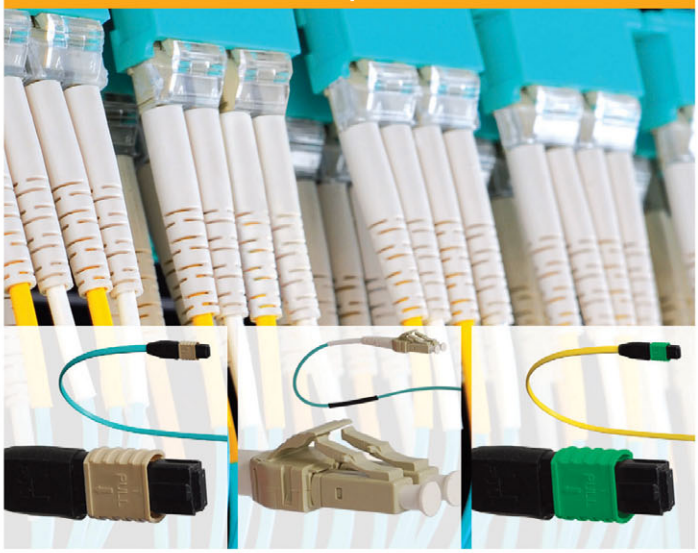

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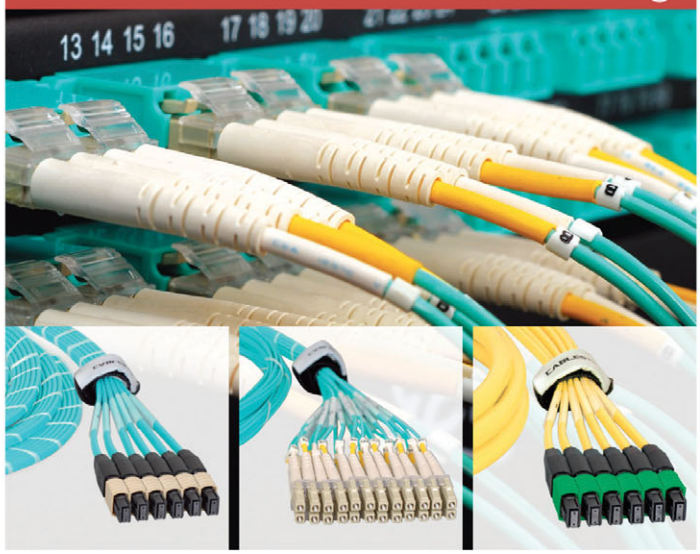

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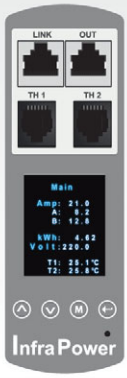

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Tablet Shipments Will Surpass PCs This Quarter

Although the number of PCs shipped this year will still surpass the number of tablets shipped, the fourth quarter will be a different story, according to research firm IDC. Analysts there say tablet shipments this quarter will outpace shipments of desktop and portable PCs combined. By 2015, IDC notes, tablets will outsell PCs on an annual basis. IDC reports that shipments in what it calls the worldwide smart connected device market—PCs, tablets, and smartphones—will be up 27.8% compared to last year; that's down from last year's 30.3% year-over-year growth.

Here's a breakdown by product category:

	2013 Shipments	2013 Market Share	2017 Shipments	2017 Market Share
Desktop PCs	134.4	8.6%	123.11	5%
Portable PCs	180.9	11.6%	196.6	8%
Tablets	227.3	14.6%	406.8	16.5%
Smartphones	1,013.2	65.1%	1,733.9	70.5%

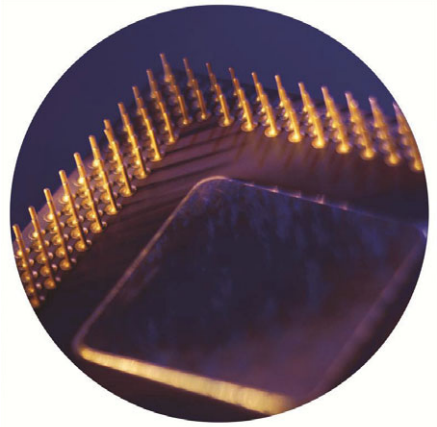
(shipments in millions)

Pew Study Gauges Perception Of Online Privacy

There is a general understanding in the tech industry that there should be no expectation of guaranteed privacy when using the Internet. According to a new survey from Pew Internet & American Life Project, however, most Web users prefer to be anonymous at least sometimes when online, and 86% "have taken steps online to remove or mask their digital footprints." Although 59% don't believe it's possible to have complete online anonymity, 37% believe it is possible.

The following figures indicate the percentages of those surveyed who report negative online experiences related to privacy and security problems:

- 21% had their mail or social networking account compromised or hijacked
- 12% were victims of online stalking or harassment
- 11% had important personal or financial information stolen
- 6% were victims of an online scam resulting in financial loss
- 6% had their reputation damaged
- 1% had their job or an educational opportunity compromised



Spending On Semiconductor Equipment Declines But Will Recover

Weak semiconductor market conditions are beginning to improve, according to research firm Gartner. Although the market shows signs of picking up pace during the remainder of this year, spending on semiconductor equipment will be down 8.5% this year. Dean Freeman, research vice president at Gartner, says the market should recover next year. "Looking beyond 2013, we expect that the current economic malaise will have worked its way through the industry, and spending will follow a generally increasing pattern in all sectors throughout the rest of the forecast period." Gartner predicts that semiconductor capital spending will be up 14.1% next year and 13.8% in 2015.

Report Sheds Light On The Future Of App Downloads

Although mobile app stores will see fairly dramatic growth in both downloads and revenues over the next couple of years, Gartner expects that growth will slow in later years. "The average downloads per device should be high in early years as users get new devices and discover the apps they like. Over time, they accumulate a portfolio of apps they like and stick to, so there will be moderate numbers of downloads in the later years," says Sandy Shen, research director at Gartner. Average monthly downloads per iOS device will decline from 4.9 this year to 3.9 by 2017; Android users currently download an average of 6.2 apps per month per device, which will decline

to an average of 5.8 apps by 2017. This year, Gartner predicts downloads will reach 102 billion (up from 64 billion in 2012), and revenues will reach $26 billion (up from $18 billion last year). Free apps will account for 91% of all downloads this year.

Updated Industry Standard Aims For Greater Cloud Security

As cloud use expands, so do demands from both cloud providers and customers for greater security. Providing a standard way to assess cloud-centric information security risks is the goal behind the Cloud Security Alliance's Cloud Controls Matrix (CCM). The

CSA recently released version 3.0 of the matrix, which, among other things, adds new control domains to help address security risks during the access of, transfer to, and securing of cloud data. "The decision to use a cloud service distills down to one question, 'Do I trust the provider enough for them to manage and protect my data?'," says Sean Cordero, co-chair of the CCM Working Group. "For customers, [CCM] acts a catalyst for dialogue about the security posture of their service providers, something that before the CCM existed was impossible."

Gartner: "Digital Business Incompetence" Could Lead To Failure

By 2017, a quarter of businesses could lose their competitive ranking because they're not using technology to their advantage, according to Gartner. "The next decade will move beyond the notion of using technology to automate businesses and toward positioning technology as revenue builder, market maker, and customer finder," says Diane Morello, managing vice president at Gartner. "When companies have those targets in mind, digital business becomes real." The first step to ensuring success when it comes to digital business activity, Gartner reports, is to identify key strategy players and people who possess technology and business expertise—whether inside or outside your organization—and bring them together to launch a digital business community.

Market For High-Performance Computing Systems Starts Rebound

After about five years of declines—since the economic recession began in 2008—the market for high-performance computing systems is beginning to recover, according to IDC. In the second quarter of this year, factory revenue was up 7.9% from a year ago. The workgroup segment (HPC systems less than $100,000) had the greatest year-over-year growth, with revenues up 45.1%. Sales of departmental systems ($100,000 to $249,000) were up 33.8%.

Software Storage Revenues Reflect Emphasis On Efficiency

Companies spent 4.1% more on security software in the second quarter of this year than in the same quarter last year, with total revenues for this year's second quarter at $3.5 billion, according to IDC. The largest category, accounting for $1.3 billion of the total, was data protection and recovery software, with revenues up 8.9% year-over-year. The smaller storage and device management software category, however, is growing more rapidly; in that category, there was 9.1% growth and $674 million spent in the second quarter. "Once again," says Eric Sheppard, research director with IDC, "organizations continued to invest in storage software that improves the resiliency and operational efficiencies within their storage infrastructure."

More Technology Projects Being Funded By Business, Not IT

Today's business executives are more tech savvy. Combine that with easy access to cloud computing services and pressure to quickly implement new technology initiatives, and you have line-of-business managers who are increasingly spearheading IT projects, according to IDC. IDC found that 61% of enterprise technology projects are now funded by the business rather than IT department, and IDC expects IT spending

by business units will outpace IT spending by IT departments for the foreseeable future. IDC offers several ways IT leaders can improve their relationship with the business, including learning the business and unique processes, building relationships with key stakeholders, and bringing new technology ideas that could positively impact the business.

Americans Increasingly Reliant On Cell Phones For Internet

About two-thirds of Americans who own a cell phone now use their phone to go online, according to the recently released Internet & American Life Project from Pew Research Center. With 91% of American adults now owning a cell phone, that means 57% of them are cell Internet users—a proportion that has doubled since 2009, Pew Research Center reports. Perhaps more surprising is that 34% of American adults, or 21% of the cell-phone-owning public, primarily use their cell phone, rather than a PC or tablet, to access the Internet.

Lighting In The Data Center

Focus On Newer, More Efficient Technology & Implement Conservation Strategies

Most data centers can become so focused on the efficiency of servers and other equipment that they completely forget to look at how lighting can affect power consumption.

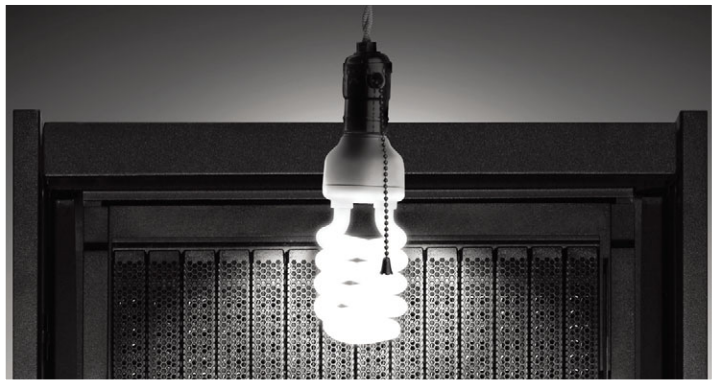
Although it's true lighting accounts for only a small percentage of total energy usage in a data center, that doesn't mean you can ignore it. There are some simple tweaks you can make to your existing lighting approach to improve efficiency to some degree, but you can also opt for large-scale systems that give you more control over lighting than you may have thought possible.

Either way, it's important to give some attention to lighting in the data center, because when it comes to improving efficiency, every little bit helps.

Switch Fluorescent Bulbs For LEDs

Many companies have relied on traditional fluorescent bulbs both in the office and in the data center for years. Because these bulbs are less expensive than some newer alternatives, and most facilities were built with traditional bulbs in mind, data center managers decide to maintain the status quo.

But fluorescent bulbs are often inefficient, meaning that even if you save money upfront by purchasing large amounts in bulk, you're probably wasting money by using more energy than necessary. LED lights are a much better alternative because not only are they often brighter than fluorescent bulbs, but they can also save you money in multiple ways.



"LED lighting is a great way to increase energy efficiency in the data center," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net). "LED lights are not only energy efficient, but they also run at lower temperatures than fluorescent lighting does, rewarding you twofold with lower lighting costs as well as lower cooling costs."

For companies that are focused on green energy initiatives or like to follow best practices from The Green Grid, Viars also points out that LED lights can help reduce your PUE number, which will improve the overall efficiency of your data center.

Consider A Smart Lighting System

Installing LED bulbs is a great place to start when improving lighting efficiency, but it shouldn't necessarily be your only effort.

The Lawrence Berkeley National Laboratory's website (www.lbl.gov) provides quite a few best practices for data centers as well as some that are specific to lighting. For one, the Berkeley Lab recommends that companies use active sensors to shut off lights when a data center is unoccupied as well as occupancy sensors that can automatically detect whether someone is in an area and requires lighting.

The best way to take advantage of sensors is by implementing a smart lighting system that "offers ultimate versatility for managing lighting throughout the data center," Viars says. "These Web-based systems can be set to operate either on a timer or in response to occupancy sensors, and they can even be set to operate down to the aisle level by illuminating a specific aisle only when it is in use. These systems also incorporate

Take Advantage Of Bi-level Lighting

In addition to sensors and overrides, the Lawrence Berkeley National Lab recommends that data centers take advantage of bi-level lighting solutions. These systems take task-based lighting to new level by providing different brightness levels depending on the situation.

During periods of low usage or normal foot traffic, you might have one lower setting because detail work is unnecessary. But then you can have a second, higher power setting if employees are performing a particularly complicated installation. You could set up a smart lighting system to control the bi-level lighting systems automatically but also add a manual switch so employees can decide for themselves how much lighting is needed for a certain task.

dimmers, so that you can provide only as much light as you require," Viars says.

Balance Efficiency & Adequate Lighting

One of the biggest worries with implementing more advanced lighting systems is that you might have to sacrifice lighting quality for better efficiency.

"It can be very difficult trying to find a balance between providing sufficient lighting within the data center and keeping energy costs down," Viars says. "On the one hand, it is imperative to ensure that the aisles are adequately illuminated; poor lighting can cause the technicians working inside the cabinets to make errors due to low visibility, such as pairing the wrong color patch cord to a port. On the other hand, you don't want your lighting to consume too much power, as that is neither eco-friendly nor wallet-friendly."

To help overcome this issue, the Berkeley Lab recommends data centers always put overrides near occupancy-based systems so that workers can manage the lighting in unique situations. Plus, the Berkeley Lab notes that companies should provide task-based lighting, which means that you place light fixtures in locations where employees are working the most. The lighting needs in a data center supply closet are different than those for the main server room, so you need to choose the right lighting for the right situation and always keep efficiency in mind.

Lights On vs. Lights Off Data Center

Viars note that different data centers have different lighting concerns. If your data center has a considerable amount of foot traffic and employees are frequently working in and around the equipment, then you may need to have more continual lighting in place than a data center that is managed remotely. However, both types of data centers may have similar issues, such as leaving enough light for security cameras, so you have to consider what type of lighting system best fits your data center as a whole.

"If you are in a 'lights on' data center, you'll want to heed advice on how to most effectively increase the efficiency of your lighting systems, since you'll be keeping it lit 24/7," Viars says. "This is less of an issue in 'lights off' data centers. Those IT managers will instead want to lean toward finding ways to make sure that lights are only left on when needed. In these centers, IT managers may wish to have remote access to lighting systems, in case a light is left on once the technician leaves the premises."

Considerations With New Construction

Building a new data center opens up a world of possibilities for improving lighting efficiency because you're essentially starting from scratch and can design with lighting in mind.

If your data center is in pre-construction, provide the architect with the planned layout for your cabinets, says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net). "This will allow them to align the overhead lighting with your aisles, ensuring that the light reaches the areas it needs to with minimal obstruction." By creating an optimal layout with well-placed lighting fixtures, you may be able to use fewer lights and cut down on energy costs.

BONUS TIPS:

Use Spot Lighting

Instead of making the entire data center brighter, Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net), says companies should consider implementing rack-mounted lights that "consume little energy and resolve any trouble areas you might have." Although she warns that these types of lights "will not affect the overall efficiency of your data center," they can help "reduce the chance of human error."

Go Beyond The Lights Themselves

To improve lighting, you can do more than just change bulbs and systems. Consider swapping out your physical storage units. "If you can, opt to go with white cabinets rather than black ones," Viars says. "Since black is non-reflective, it is only a further detriment to a poorly lit area. White cabinets, however, will reflect light and allow for higher visibility in lower-light areas."

Alternative Approaches Keep Data Centers Cool

When & How Newer Methods Make Sense For Improving Efficiency & Cutting Costs

Data center managers are looking to cut costs and improve efficiency across the entire facility, and cooling is one area that seems to need constant attention. Although implementing a new CRAC unit is great, it may not be enough to reach your goals.

It's important to think outside the box when it comes to cooling, because more alternative approaches are entering the market. You should look at your data center and decide whether it's time to invest in a more efficient or more environmentally friendly cooling solution.

Free-Air Cooling

Free-air cooling is perhaps one of the most talked about alternative cooling approaches.

A free-air system "draws outside air in through filters to remove any undesirable particulates and then either adds or removes moisture from the air to provide usable cool air based on measurements of the humidity," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net). "Free-air systems are often the most inexpensive solutions when it comes to implementation and infrastructure," she says, which is one reason they are popular.

Unfortunately, there are some disadvantages to free-air cooling. For one, you may not live in a region with plentiful cool air throughout the year or you may live in an area with high humidity. The humidity factor is crucial, says Jenna Maertz, consulting analyst at Info-Tech Research Group, because high humidity requires dehumidification, which uses more energy and raises costs.

Data centers located in larger cities may have to contend with poor air quality. "While even clean air requires some level of filtering, city air will especially require energy to filter and cleanse before it is ready to enter the data center," she says.

Liquid Cooling

If free-air cooling isn't available in your region or you're looking for a different approach, consider liquid cooling. A liquid cooling system "circulates either water or a water and glycol mix outdoor to cooling towers, and then fans move the water down the tower to dissipate it," Maertz says. She says the fans are only used when the outdoor temperature is warm and that little fan power is required in cooler temperatures. Some data centers even use water from nearby lakes to liquid cool the facility, but that's not an option for every company.

Viars says liquid cooling is potentially beneficial because it can reduce the amount of energy required to cool IT equipment by up to 97%.

As with any new technology, liquid cooling has its downsides. Most notable, liquid cooling systems often have high upfront implementation costs and high maintenance costs, Viars says.

In-Row & In-Rack Cooling

Some companies are eliminating hot spots with in-row and in-rack cooling systems, but these approaches can also be used on a larger scale. Viars says that a major benefit of in-row and in-rack cooling is that "they can usually be retrofitted into an existing data center,

Improve Your Existing Cooling Setup

Even if you aren't able to invest in alternative cooling systems right now or you still want to supplement them with traditional air-conditioning units, it doesn't mean you can't improve your cooling situation. In fact, there are many ways to maximize the efficiency of your existing cooling setup by taking advantage of retrofits.

"If there are small, isolated areas in which heat is becoming an issue, then one might consider just supplementing those particular racks with some additional cooling," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net). "Door-mount fan panels might be a consideration for these types of issues. Row-based cooling solutions can be implemented to address heat concerns in higher-density applications. Exhaust chimneys can be used to reduce overall heat in the data center, if there isn't already a functional containment solution in place."

making them a feasible choice to resolve budding heat concerns before they become serious issues." You could focus on a few of the hotter areas by implementing an in-row or in-rack solution but maintain your overall air-conditioning unit for the rest of the facility.

Viars says in-row and in-rack cooling can be "rather costly if you are looking to utilize it on a larger scale, especially in high-density centers," but it's still an option for some businesses.

It's even possible to route liquid cooling tubes directly into racks and cool equipment from the inside out. It may not be a total replacement opportunity right now, but in the future, it may be possible for data centers to liquid cool all of their racks and only use an air-conditioning unit to keep the ambient temperature comfortable enough for employees.

Natural Gas & Renewable Power Sources

Cooling efficiency doesn't solely rely on the air-conditioning unit itself. You also need energy to power those cooling solutions. Some data centers may want to look at alternative energy sources rather than alternative cooling methods.

For instance, Maertz says natural gas prices are at a low right now due to oversupply, which makes it an attractive option for many companies. Plus, if your data center is near underground pipelines, you'll have lower carbon fuel consumption because the gas doesn't require transportation, she says.

There are also many other renewable energy sources, including wind, solar, hydroelectric, and geothermal. Maertz says that "most of these resources are too remote to be widely available and the cost too high to transport them." But if you were able to build a new data center near one of these renewable energy sources, it may be a more attractive option. P

Find The Right Balance & Follow ASHRAE Guidelines

Alternative cooling approaches are great, but you still need equipment to implement them and they may not necessarily be available year-round (especially free-air cooling in the summer). At those times, it's important to make sure you aren't undercooling or overcooling your data center.

Jenna Maertz, consulting analyst at Info-Tech Research Group, says that ASHRAE's new recommendation for data center temperature is 80.6 degrees Fahrenheit, which means "you can turn down your existing cooling systems and you can utilize free cooling more often." Instead of only being able to use free air during the fall and winter, you may be able to open it up to the spring as well and only rely on other cooling methods during the hottest summer months.

BONUS TIPS:

Conduct Research

"There are many different types of cooling systems available, and finding one that will work best for you will depend on several different factors," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net). That's why it's crucial to do research before purchasing a traditional cooling system or moving up to a free-air, liquid, or other alternative cooling method. "Take into consideration any current issues, if implementing in an existing data center, your projected growth in regards to any need for scalability, the density of your center, room size, and your budget," Viars says. "Once you can prioritize your concerns and needs, you'll be able to find a solution to address them appropriately."

Push For Maximum Cooling Efficiency

Whether you're using old air-conditioning units or investing in new ones, you should always make sure they are running at full capacity, says Jenna Maertz, consulting analyst at Info-Tech Research Group. She says many data centers have too many CRAC units running at partial load rather than having a handful of units running at maximum capacity. By turning off "extraneous units," you will "save costs and lower energy consumption," Maertz says. Newer air-conditioning units are often even more efficient, so if you're looking at a refresh, you might want to consider opting for more advanced cooling equipment. These cost savings could then open up the possibility for an alternative cooling implementation in the future.

Encryption In The Enterprise

Protect Your Data With Best Practices & The Right Solutions

Every company has sensitive information that needs to be protected. Although you may think that antivirus or anti-malware solutions are enough to protect you from outside threats, remember that not all data resides behind your firewall and that sometimes, insiders can be the threat.

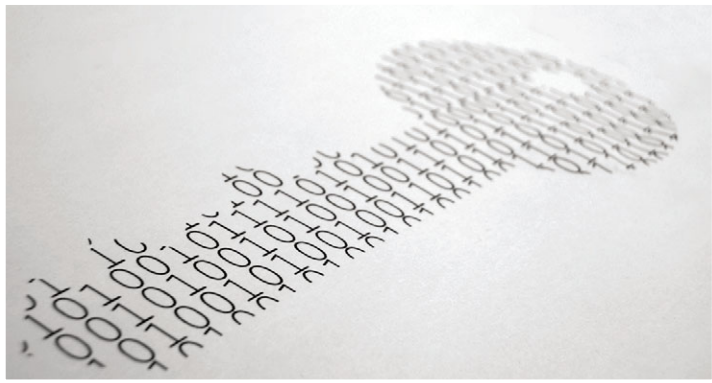
Encryption is essential if you want to protect your data while it's at rest or in transit. But in order to truly benefit from it, you need to make sure you have the right approach.

Be Judicious

Hackers are getting better at accessing protected data, which might lead you to believe that you should just encrypt all information within your data center. But Eric Ouellet, research vice president at Gartner, says there are many reasons why you should be judicious with the data you choose to encrypt.

"If something is encrypted, you can't search it or index it, and it becomes opaque," Ouellet says. "You had something that was visible, now you've just put it in a box, and you have no idea what's in that box, because you didn't label it. You don't want to encrypt everything, so you end up picking and choosing certain elements that you need to protect."

James Quin, director of research at Info-Tech Research Group, says companies should focus on encrypting "anything that is personally identifying, financially-related, and of course anything that would be considered intellectual property (IP) or a trade secret." Some examples of data that should be encrypted are credit card numbers and customer identification records.



Know Industry Regulations & Company Policies

Always keep in mind that your data may be under certain restrictions or regulations that require encryption. Payment Card Industry (PCI) for financial institutions and HIPAA for healthcare facilities are just two examples of the many regulations that cover certain industries.

Ouellet says following these and any other applicable regulations is absolutely critical, but that they only tend to focus on sensitive identifiable information for either customers or patients. For that reason, you'll need to develop your own internal policies for what other types of data you might want to encrypt.

Ouellet recommends encrypting soft IP data, which could consist of "internal documents about a sales process or a process followed internally to build a product" as well as a hard IP, which could be a specific chemical formula for a product or similar information. Determine what data is most important to your organization and make sure it is protected.

Choose The Right Solutions For The Right Purpose

There are many different types of encryption, but Ouellet says the most important thing to remember is that "not all encryption works with all different types of datasets.

For example, full disk encryption is really to protect hard drives such as those on a laptop. "That's really the intended use and purpose for that, but it's not intended or geared toward being able to protect data in transit, because that's not how it's applied," he

Encryption As A Last Line Of Defense

Although it's important to encrypt data and prevent access to sensitive information, it's equally important to remember that encryption shouldn't be your be-all, end-all security approach. In fact, according to James Quin, director of research at Info-Tech Research Group, encryption should be your last line of defense.

"By the time you are relying on [encryption], all of your other defenses have either failed, in the case of encrypted data housed somewhere on your network, or never existed, in the case of a laptop that is outside of the corporate environment," Quin says. "Last lines of defense must be strong because once they fail, there is no other protection. Ensuring that encrypted laptops are powered down rather than just asleep when not in use and that keys are strong, and passwords complex, are essential steps."

says. He also points out that while some solutions may use the same type of cryptography, whether it's AES or another method, that doesn't mean that the same solution can be used for database encryption and laptop disk encryption.

Full disk encryption is used to encrypt an entire drive and all of its contents, but Quin says there are also some file- and folder-based encryption solutions that only encrypt portions of a hard drive. In addition to those solutions, you can also find self-encrypting drives that can be used in computers, servers, and storage arrays.

With so many options available, Ouellet says that the key to proper encryption is to determine "what you want to do as an organization, build out the various buckets [of data] that you need encryption for, and then find the tools that meet those requirements."

Consider External & Internal Network Encryption

Encryption is often focused on data at rest, but you also need to use encryption to protect data in transit and your network as a whole.

"Diligent organizations will look to provide encryption for all of the various storage locales, whether they be endpoint devices or data stores like network drives and databases, as well as network traffic through the use of internal VPN tunnels, which essentially build an encrypted pipe through which data traverses," Quin says.

VPN connections can be used to further encrypt data sent over the network from the company to the remote worker and vice versa. Companies can also use this form of network security to encrypt packets of information sent from one organization to another.

Network encryption can further secure data, Ouellet says. "Sometimes you'll have an internal process where you have a server of some sort that's communicating with another server resource internally, so maybe you have a data processing server communicating with a back-end server to get some information and then it forwards it to another application server somewhere else. That would be an example of where you would have internal network encryption."

By combining internal and external network encryption, you can protect your data regardless of its location and throughout the entire transmission process.

Keep Track Of Your Cryptographic Keys

Eric Ouellet, research vice president at Gartner, points out the importance of backing up and managing your cryptographic keys. "If you lose the key, the data is shredded and you'll never get it back." Vendors design encryption solutions so that "there are no backdoors," Ouellet says, so without the key you used to encrypt the data, you could potentially lose access to your data.

"A lot of the organizations I talk to say they're going to figure out all of the bits and bytes and all of that stuff, but they forget about the long-term process," Ouellet says. "They might be living with this cryptography for the next five, 10, or 20 years, depending on what it is they're doing. It's important for them to be able to maintain currency over the long term so that they can ensure they have access to the data whenever it is that they need it."

BONUS TIPS:

Protect Data From Loss

"Encryption is about protecting data from loss, and while it is a useful solution, it is far harder to lose data if it is never in a position to be lost in the first place," says James Quin, director of research at Info-Tech Research Group. "As such, IT leaders and enterprise users should always be asking themselves whether sensitive information needs to be put on to laptops or USB keys to be potentially lost in the first place."

Understand The Options

A number of hardware and software encryption options exist today. Encrypting data at the drive level, for example, can offer capacity and performance boosts. There are also a variety of encryption applications available, and most are geared toward protecting data at a certain level. For example, file or folder encryption can lock down data at that level, while database encryption is geared toward protecting those particular areas of a corporate data warehouse. In addition, some companies have attempted to implement internally developed encryption strategies. Although this method isn't widespread, it does occur in the industry and is almost never as secure as commercially approved methods, experts note.

Make Sure You're Ready For Software-Defined Storage

Research What It Is & Test Its Possibilities So You'll Be Prepared For The Future

Software-defined storage is a relatively new concept that entered the scene hot on the heels of software-defined networking. Like SDN with networking equipment, SDS aims to make the management of storage solutions much easier.

Even though SDS is far from being a mature technology, you should start researching it in earnest, so you have the knowledge and ammunition you need to be able to decide what role, if any, it will play in your data center's future.

What Is It?

Traditionally, individual storage solutions from different manufacturers have their own separate management software built-in. This means that if you were to install three different types of storage, you would have to contend with three different pieces of software.

Software-defined storage is "fundamentally about abstraction and getting outside the box," says John Sloan, principal consulting analyst at Info-Tech Research Group. The goal is that instead of having multiple software solutions and controllers, you have one central management system and control over every storage device.

Centralized management has several obvious benefits, including increased visibility of available resources to help maximize efficiency, but it also makes it possible to add agility to your infrastructure, improve quality of service, and optimize your storage costs, says Dave Russell, vice president and distinguished analyst at Gartner.

"Many people like to say the goal of SDS is to be cheaper or to run on commodity hardware, and that in fact may turn out to be true, but in my mind there are still going to be valid reasons to have high-priced storage arrays," he says. Possible reasons include resiliency and availability, previous investments, and SDS training. "So I think that it's about cost optimization that ideally lowers cost. This may not mean commodity hardware in all use cases and circumstances."

How Does It Work?

Because software-defined storage is such a new technology, there isn't one clear or 'right' way of implementing it. But regardless of what approach you take, the goals should always be somewhat the same.

"A key notion of SDS is trying to get the often opaque and sometimes mysterious domain of storage close to something that is more aligned with the business," Russell says. "In IT terms, the best way to do this is to make storage more application-aware, or application-aligned, so that the right capabilities and services can happen at the right time to the applications data, ideally with less and less human involvement."

But how does a data center actually start that automation process and abstract the management control out of the device? One way is to "virtualize the processor," which Sloan says lets you run the

Key Points

- Software-defined storage (SDS) essentially takes the management function within a storage solution and moves it outside the box.
- SDS may be able to commoditize your storage and make it less costly for future upgrades.
- The maturation of SDS is still a few years away, but start now to research and test.

Get Started

"Companies shouldn't go out to acquire SDS in the same way they would go out and get the cloud," says John Sloan, principal consulting analyst at Info-Tech Research Group. "They have to look at total features and functions and total cost per terabyte. Support will be as important as ever. The buyer will be able to look at what features and functions they are getting for the money on the software side and what capacity they are getting for the money on the hardware side." He adds that storage vendors are wrestling with this because they're used to just selling a box, so make sure your vendor can adequately explain how the software and management work.

virtual controller on a server and "present all the storage that is attached to that server and other servers as one big storage pool."

But this isn't the only approach to SDS. Some companies are actually putting "storage management right into the server virtualization hypervisor, so all the storage those virtualized host servers can see is pooled and managed as if it's a big virtual SAN array." The approach you take ultimately depends on your current infrastructure setup and what type of implementation would cause the least disruption.

The Future Of SDS

Sloan says that any technology that claims to be software-defined is "part and parcel with the cloudy future of the data center." This means that "how fast and how soon it happens depends on how well the storage industry manages the transition and how soon they feel they can let go and still make revenue," he says.

Just as data centers will need to adjust to the new SDS-based future, storage vendors also have to make the adjustment, so the future of the technology will remain unclear until solutions enter the market and mature.

Russell agrees that SDS is still up in the air to some extent and that the real answer as to when SDS will become mainstream "depends on how strictly or loosely you define SDS." There are currently solutions on the market that will enable SDS with a virtual appliance, but they don't necessarily bring that automation and orchestration into play that is a crucial benefit of the technology.

Because of that, Gartner hasn't been "too aggressive" with its projections, Russell says. Gartner expects that in 2014 the SDS marketing hype will increase and definitions will start to mature. In 2017, products will start to solidify until about 2020 when "product adoption and cross-industry collaboration leveraging standards" will emerge. P

Action Plan

Learn. Take advantage of all available information to get a solid understanding of software-defined storage (SDS). Prepare employees for a sizable and fundamental change.

Watch. See how other companies use the technology, read white papers and case studies, and get a grasp of what all goes into an SDS implementation.

Test. Before SDS hits mainstream, you need to start thinking about how it will fit in to your specific environment and set up pilot programs to ensure a smooth transition.

Wait. SDS is not currently a mature technology, so it's important to not jump in right way, but instead wait for multiple solutions to hit the market and then compare them.

Top Tips

Start a pilot program. Dave Russell, vice president and distinguished analyst at Gartner, recommends that while you're "weeding through the hype," you should "also run early pilot projects for non-mission-critical workloads to ascertain cost benefits and gauge organizational readiness for change." You have to prepare your workforce well ahead of time for software-defined storage (SDS) because it will involve "questioning conventional thinking" and "learning newer skill sets," Russell says.

Research, research, research. "Although SDS is nascent, and is far closer to being a concept than a well-defined category of available solutions, the potential for cost improvement and enhanced manageability make the technology something to keep abreast of," Russell says. So even if you aren't quite ready to launch pilot programs, at least start researching the technology so you'll be ready when it goes mainstream.

A simpler definition. John Sloan, principal consulting analyst at Info-Tech Research Group, compares SDS to what has been going on with x86 servers for almost a decade. "In servers, we call it virtualization rather than software-defined, but a virtual server is a server that is defined by software." At its core, you could consider SDS virtualized storage, but the term "software-defined" is used simply to differentiate it from server virtualization.

Simple Ways To Maximize The Value Of Virtualization

Know Whether Deployments Are Giving You A Return On Their Investment

We're past virtualization being a hyped technology promising many benefits. Today, virtualization is established, and the payoffs it can deliver concerning reduced physical servers and power and energy consumption and bolstered IT efficiency and productivity are well known.

Research indicates most enterprises have adopted virtualization in some form. The question now is if enterprises are seeing the ROI they expected and are maximizing the value of virtualization investments. Here's a look at some mistakes that result in lower ROI or less value and tips to help maximize the value you're getting.

Just Do It

For enterprises that still have concerns about virtualization and whether it is worth the investment, the answer seems to be a resounding yes.

"Customers who embrace virtualization and understand its value/limitations often have a great perspective on what virtualization means to the organization," says Mark Margevicius, research vice president at Gartner. He hails virtualization as a "transformational technology" that has generated value in areas of cost, ROI, operations, efficiency, scale, and performance. "By all measures, virtualization is a grand-slam success for nearly all customers," he says.

Dick Csaplar, Aberdeen Group senior research analyst, virtualization and the cloud, says Aberdeen research shows that as of April 2012 about 55% of all applications were deployed on a virtualized server, though they tended to be smaller, tier 2-type apps. Tier 1 apps (SAP, email, database, and mission-critical) are virtualized to a much lower degree, he says, but "even at this rate [virtualization] has provided very dramatic results, especially reducing the number of servers in the data center." Although "virtualizing the remainder" won't provide as dramatic results, he says, it's "definitely worth the effort."

Csaplar notes that storage virtualization is less widely deployed and can take many forms, plus returns vary depending on what enterprises do. Storage virtualization can help companies struggling to deal with "exploding" amounts of data, although data tiering, decompression, and deduplication can also produce significant savings, he says.

"Desktop virtualization is the least widely deployed and generally has been implemented for only a portion of each company's workforce," he says. Benefits here relate to enhanced employee efficiency, rather than dramatic savings on new hardware or reduced head count.

Quantify The Value

Margevicius says quantifying the value of virtualization efforts depends on the implementation. Some companies do little quantification of value, while others adopt virtualization as best practice for IT operations, he says.

Initially, enterprises built server virtualization projects on cost savings associated with deploying fewer servers, he says. Storage virtualization efforts were built on the same premise, "so real dollars can be saved," he says.

Typical ROI from deployments can vary greatly. A common thread among nearly all customers, Margevicius says, is "a better operational state is derived from virtualization, so that flexibility, redundancy, failover, and business continuity are common outcomes from virtualization projects."

Know The Costs

Data center managers should expect senior management to seek out more information concerning the costs of virtual installations, according to an article written by Forrester Research senior analyst Dave Bartoletti.

Data center managers, for example, should take the time to compile information such as the incremental costs of deploying a new virtualized application in a present virtualization environment and tracking annual costs related to managing and maintaining a VM. Bartoletti writes that data center managers should be able to articulate their virtualization workload unit costs if asked to defend them.

Csaplar says typical ROI regarding virtualization deployments fluctuates greatly based on company size, age of existing infrastructure, and the degree of virtualization implemented. "It's safe to say that with so many companies deploying server virtualization, it gives a very positive return given the wide and deep deployment," he says.

When enterprises deploy server virtualization to the oldest servers with the lowest utilization, he says, they generally expect a "10-to-1 reduction" in server numbers in their data center," Csaplar says. The total lessens as applications grow larger and installed servers are no longer old and slow. Companies can expect better operational performance, "as deploying new applications to a virtualized server is much faster, and dealing with managing the infrastructure is much easier," he says.

Look Ahead

Margevicius says all aspects of IT infrastructure are under consideration for virtualization, including storage, desktops, applications, and the network. Csaplar expects the next wave of data center transformation to involve the private cloud space.

"Virtualization, instead of widespread server sprawl, can create widespread VM sprawls," he says. Private clouds bring these VMs under one management umbrella and provide tools to charge the organizations gaining the benefits with the right financial charges. Private clouds also empower end users to self-administer their own server infrastructure and give them "immediate returns and responsibility for their charges."

Margevicius says, "What the cloud has done for virtualization is create massive economies of scale whereby customers who leverage cloud typically receive best-in-class pricing and service from providers." The cloud's future contribution to virtualization, Csaplar says, will include enabling IT to migrate from "being a cost center and supplier of IT computing producer" to being a partner that brokers computing cycles from various sources (internal and cloud-based).

Avoid These Mistakes

A tendency when looking at ROI in any area is focusing only on costs. Margevicius says those that do "are selling themselves short" on virtualization's value. Virtualization, he says, is really about "transforming how organizations provision IT resources far more effectively and efficiently, which in turn yields real business value outcomes."

Another mistake is not recognizing that VM sprawl can replace server sprawl.

"It's so easy to deploy new VMs that they get spun up but never taken down," Csaplar says. "Companies need to have lease time limits that set kill dates for expired projects."

Prepare Yourself

Most sources on the subject agree that a majority of enterprises are using virtualization to some degree, including deploying applications on virtualized servers. Nearly all sources report the results of doing so can return benefits across multiple areas, including benefits that can be categorized as being dramatic.

"The easy stuff is done," says Dick Csaplar, Aberdeen Group senior research analyst, virtualization and the cloud. Moving forward, he says, benefits in desktop virtualization, for example, won't necessarily relate to savings tied to reducing equipment but have more to do with improved efficiency.

BONUS TIPS:

Test, Test, Test

When it comes to virtualization deployments, Mark Margevicius, Gartner research vice president, suggests that enterprises "test, test, and test some more." In addition to testing, Margevicius says, employing processes and tools is also key to realizing successful implementations, "as the 'how' and 'with what' to manage virtual environments are very different than non-virtualized environments."

Investigate Private Clouds

Dick Csaplar, Aberdeen Group senior research analyst, says although small and midsized companies have been quick to adopt server virtualization, they have been slower to adopt private clouds. He recommends companies investigate what this form of technology can do and offer in terms of a company taking "the next step in the data center transformation." To maximize virtual deployments, Csaplar suggests researching and selecting a private cloud infrastructure management application that can transform a highly virtualized environment into a private cloud.

Plan For & Perform A Server Refresh

New Servers Can Be More Efficient & Effective, But Only If You Know When & How To Upgrade

For every data center, there comes a time when new demands are placed on a server or the cost of maintaining a server outweighs its usefulness. Being able to recognize the signs of such occurrences, however, isn't always easy. Here are a few money-saving and performance-enhancing tips for going through a server refresh.

Look At Upgrading Components First

You may assume that a server refresh requires an overhaul, but it's possible to simply swap out individual components to give your servers that extra boost.

"Provided a customer sticks with industry-standard chassis and rack solutions, swapping out components or systems for higher-efficiency models are the most cost-effective paths to hardware upgrades," says Don Clegg, vice president of marketing and business development at Supermicro (408/503-8000; www.supermicro.com).

"Depending on supplier and processor road maps, a refresh can start at the component level upgrading HDDs to SSDs or installing faster memory and higher bandwidth interconnectivity options." You could also upgrade your CPU, the BIOS on a motherboard, or other components, he says.

It's possible to keep your existing racks and overall infrastructure setup without completely starting from scratch.

And you can refresh over time rather than all at once, letting you spread out the costs associated with server upgrades.

If you don't already have standardized racks or enclosures for mounting multiple equipment modules, then a server refresh is a great time to make that change. "Look for server solutions with designs incorporating sliding rails and tool-less chassis access for easy maintenance and access to hot-swap hard drives, power supplies, fans, and other components that may need replacing," Clegg says.

Make Sense Of Cycles

"I've been in hundreds of data centers in my life, and I can tell you that they try to keep servers running as long as they can," says Dick Csaplar, senior research analyst at Aberdeen Research Group. "Once you have an application up and running and it's running fine and users are happy, you have so many other challenges in your life that going back and, say, migrating that application to a newer server, you're just not going to do it."

Typically, three years is the expected life span for servers—something you can tell, Csaplar says, because "most servers are sold with a three-year warranty." Although companies can buy warranties extending into years four and five, he says, "the warranty price skyrockets" because vendors have to keep older drives, CPUs, memory boards, and other parts on hand.

"It's not that [servers] aren't going to function; it's the cost of the warranty and keeping them under warranty, and you absolutely want to do that, particularly as you go out in time," Csaplar says. "The second thing is that the rate of modernization in servers today is just amazing." Getting everything possible out of a server is appealing, but doing so can eventually cost more in the warranty while "giving up a lot of compute power

Become More Energy-Efficient

Implementing a server refresh provides a great opportunity to be more efficient environmentally and in terms of energy consumption. Older servers will often draw more power than newer, more efficient alternatives, so it may be more cost-effective to buy brand new servers as opposed to trying to maintain your existing ones. Improved energy efficiency can also lead to savings elsewhere. It will reduce the need for constant maintenance and repair, which can free up your IT team's time for other projects. And it can also make your other systems more efficient.

"Energy consumption for data center cooling is rising," says Don Clegg, vice president of marketing and business development at Supermicro (408/503-8000; www.supermicro.com). "The only way to curb this runaway cost and be more environmentally friendly is to transition to energy-efficient servers that operate at higher ambient temperatures and reduce dependency on air conditioning."

by not refreshing to the newest technologies," Csaplar says.

An Opportunity For New Technology

Buying new energy-efficient servers gives you the option of upgrading the base features of your server. You can invest in not only the features you'll need now, but the features you'll need as your company grows.

Two such features, which often go hand and hand, are consolidation and virtualization. You may be able to replace two or three older servers with a single new unit, which can free up additional space for other pieces of equipment or increase the overall airflow of your data center. And you can implement server virtualization, which can lower your costs for individual computing platforms for employees.

"Virtualization has become a mainstream practice, and it can be used to assist consolidation by allowing multiple application workloads to share the same physical servers," says Jenna Maertz, consulting analyst at Info-Tech Research Group. "A combination of server consolidation and virtualization can save between 40 and 75% of upfront and ongoing hardware costs, making a server refresh significantly more affordable."

Plan For Maximum Uptime

Servers, Csaplar says, are designed to have about 99.5% uptime, which translates to just a few hours of unintended downtime per year. And those hours typically occur later in the server's life.

A condition tied to downtime is how application usage has changed. "It used to be there was one app on one server," Csaplar says. "You needed a new app, you bought a new server, and the server was being utilized 20 to 30%." With virtualization, however, three to 10 or more applications might be on a single server. "So the impact of downtime when that server goes down—and it will—is going to affect far more applications than it would have before," he says.

Remember that not all servers are equal, and not all servers support mission-critical applications. To this end, Csaplar says companies can easily create a process in which they move critical applications to their newest servers and use older servers to support applications that are less important. Csaplar says virtualization can enable such possibilities as configuring settings so that if one server goes down, the application will automatically reboot on another server. P

Map Out Your Goals

Mapping out short- and long-terms goals and strategies is vital to a successful server upgrade. Mark Bowker, Enterprise Strategy Group senior analyst, says that because server upgrades often align with new IT projects, applications, or application upgrades, it's important that "IT focus on both the life cycle of the application and how it aligns with the expected life of the server and account for planned and unplanned scale."

IT should also know its options. Too often, Bowker says, IT purchases a server with more capacity than needed, which provides the comfort of extra headroom but adds expense. "IT should understand what the latest processor chipset is on the market and what the stated road map of the chip manufacturers are," he says. "This will help avoid buying into servers that are at the end of a product life cycle."

BONUS TIPS:

Communicate With Your Server Vendor

As part of a refresh, keep in constant contact with your vendor to ensure you are getting the features you need and to request additional services that may be free. "Ask vendors to help with capacity planning," says Jenna Maertz, consulting analyst at Info-Tech Research Group. "Many vendors will try to win your business by offering free workload modeling services and tools, which can help you determine the capacity requirements for both your virtual and non-virtual workloads. This can help ensure that you get the maximum capacity out of each of your servers."

Do More With Less

"There is no such thing as an information recession, [so] organizations need to boost their return on innovation (the new ROI) by doing more with what they have," says Greg Schulz, senior advisor at Server and StorageIO Group. There are several ways to do this, including leveraging faster, denser servers that can do more work per watt, enable room to grow, and remove cost while boosting productivity.

Rethink Your Plans For Unused Equipment

Improve Your Processes For Equipment Recycling & Disposal

Hardware asset management and equipment disposal are something nearly all enterprises deal with. How well they do it, though, is a different issue.

Even those that have solid plans are finding out that the parameters involved are changing as companies embrace different business models and approaches to infrastructure. The following takes these changes into account to offer advice for evaluating and improving plans for equipment disposal.

Adjust To The Times

Overall, says Darin Stahl, lead research analyst at Info-Tech Research Group, equipment disposal isn't "the big problem it once was" for data centers even three years ago. That's because more workloads are software-defined now because of virtualization and cloud computing, which are shrinking hardware footprints and hardware-asset management requirements. Plus, more facilities workloads are moving to SaaS, IaaS, and even colocation, he says. Info-Tech research indicates 43% of enterprises have already moved key applications and services to the cloud, "so from a hardware perspective, what's left?," Stahl says.

Not long ago, Stahl says, complexities related to hardware, hardware management, refresh cycles, and the like led to "interesting sorts of paradigms," including companies moving to leasing models.

Companies, however, find "leasing isn't a hardware-asset solution; it's a financial solution," he says. In some cases, companies face having a lot of equipment at end of lease along with significant footprints rolling out simultaneously, or they realize they still need equipment they're leasing and buy it, essentially pushing out refresh cycles and putting the company in the same situation it was in before leasing.

Ultimately, becoming less dependent on physical hardware is good for the business, reliability, and economics, Stahl says, and "from a pure data center perspective, it's good because I just don't have to deal with as much stuff."

Even if an enterprise is managing fewer hardware assets and the hardware is gone, Stahl says, the question remains "have I actually shut down my service and maintenance contracts with the vendors? You might be paying for a benefit that there's no way I'll ever receive."

Overall, enterprises have become pretty good about disposing of aged equipment, Stahl says. "Certainly the economic downturn had everyone sharpening their pencils and learning that, but we're largely out of that and a lot of those workloads have left and the footprint is smaller."

Employ Best Practices

Although some enterprises are managing less hardware, they eventually still have disposal tasks to tend to, says Ken Koty, sales engineer at PDU Cables (866/631-4238; www.pducables.com). When

Key Points

- Before disposing of equipment, make certain it can't serve some purpose.
- Take bids from several disposal vendors, request they create customized proposals, and ensure solutions meet company policies and requirements.
- Many enterprises now have less hardware to manage due to increased use of virtualization and cloud computing.

Get Started

For better hardware management and disposal, Ken Koty, sales engineer at PDU Cables (866/631-4238; www.pducables.com), says asset-tracking software can keep tabs on equipment and its age. "In larger data centers, you want to make sure to include all outdated equipment in each refresh," he says. "Do it all at once and don't replace equipment daily or weekly." Data center and IT departments should have a reuse and recycling plan "that adheres to corporate compliance for reuse and recycling and should address data destruction," he says. If a plan already exists, ensure it's followed. If one doesn't, "now is probably a perfect time to create one."

such times come, he says "more than anything you want to make sure that as much of the older equipment is either reused or recycled, not just dumped in a landfill."

Koty suggests taking bids from numerous green-oriented disposal vendors, comparing offers, and challenging vendors to create customized disposal/recycling solutions. "Sometimes, the best solutions are born out of a creative challenge to think outside the box," he says. The best solutions are also sometimes more expensive but provide more benefits and add value by being greener, he says.

Get Your Money's Worth

Stahl says now more than ever, companies are "wringing every last sort of usable piece of CAPEX" out of equipment. After winding equipment down and cannibalizing it for spare parts, he says, "what are they worth on the street? Probably the gold that's in the box, right?," he says.

He suggests cascading down equipment. "You're running virtualized internal clouds now, so you have the ability to fast failover. Push that stuff as long as you can," he says. Enterprises have key equipment that was very robust holding up critical applications and services it no longer hosts, he says. "So are they adequate and just good enough to run your virtualized farm? Absolutely, because you can start to fail over those virtualized farms fairly rapidly," he says.

Koty agrees, adding that redeploying or repurposing equipment in a less-demanding environment can be a win-win throughout your company. If this isn't an option, keep usable spare parts to service or extend the life of existing equipment.

When making disposal decisions, Koty says, be sure to keep equipment you may need so you avoid having to purchase it again later. For equipment you truly no longer need, he says, consider donating it to non-profit organizations or responsibly recycling retired equipment via a reputable vendor to ensure raw materials are extracted and recycled in an environmentally friendly manner and remaining materials are properly disposed of. P

Action Plan

Think facilities. From the perspective of facilities equipment, such as UPSes, power panels, backup diesel generators, and conduits, work with a reputable removal company, check its credentials (including through the Better Business Bureau), ask for references, know how equipment is disposed of/recycled and if it meets your policy, require recyclers to provide documentation of proper disposal, and, if there are special requirements for how equipment is destroyed, ask for a certificate of destruction.

Think infrastructure. When removing infrastructure equipment from the data center, go over all company safety regulations and rules with the recycling vendor, ensure the vendor's personnel follow data center rules if moving equipment on raised floor areas, assign a data center team member to supervise the vendor at all times, ensure the vendor uses the most efficient and safest routes through your building, and ensure the vendor is licensed and bonded.

Top Tips

Develop relationships. As enterprises move to more virtualization and cloud usage, IT/data center managers will spend less time on hardware assets and more on managing service levels with the business leaders, suppliers, and vendors. This will involve new sets of skills, problems, and focus.

Look before leaping. Before disposing of older equipment, determine if it can still serve some purpose so you avoid having to later purchase equipment that is the same or similar to what you got rid of.

Go further. Equipment isn't the only thing enterprises must properly dispose of or recycle. Batteries, chemical containers for cooling equipment, and similar items should be properly handled as well. In some cases, vendors can recycle items such as used containers.

Mark it with an X. When working with a vendor, clearly mark the old equipment that you want removed so that the vendor doesn't touch or remove anything that's not marked.

Optimize Your Network For A Mobile Workforce

Make Adjustments For Remote Access, App Performance, Bandwidth & More

THE INCREASED FOCUS enterprises are placing on mobility impacts numerous areas, particularly infrastructure.

Whether the mobile devices are company-deployed or introduced via bring your own device (BYOD) programs, IT staffs are being forced to address bandwidth issues related to more mobile devices hopping on corporate networks. And don't forget other network-related issues such as security, remote access, and application performance. There are steps you can take to optimize and prepare for such issues. Here are some recommendations.

Ensure End-To-End Visibility

Based on his company's research, Jim Rapoza, Aberdeen Group senior research analyst, says it's key for IT managers to have end-to-end visibility in order to understand and optimize mobile performance.

"Traditional methods that only see what's happening within corporate networks are bound to fail," he says. "Successful organizations work to have visibility into performance all the way from the data center to the cloud to carrier networks to the end-user device."

You also need to be mindful of real-time apps. For example, Michael Finneran, an independent consultant and industry analyst, says an enterprise looking to use its WLAN for voice, video, and other real-time apps needs to have the necessary capacity, coverage, quality of service (QoS), and handoff capabilities. "Those might call for a significant upgrade if the network initially provides 'spot coverage' and is geared toward casual data traffic," he says.

Think Diversity

Today, it's typical to see heterogeneous environments that contain Windows, Mac, and other OSes; multiple mobile devices running different OSes; and different user experiences, says Gartner Research Director Akshay Sharma. When looking for a mobility platform, he says to make sure it supports multiple user interfaces, allows for single-sign-on across platforms, enables business continuity, is securely hosted in the cloud, leverages native apps on devices but allows hosted SaaS apps, incorporates data loss prevention policy based on control across apps but without forcing persona-based silos, and allows for development of "cool converged apps."

Gartner Research Director Akshay Sharma says that optimizations can occur on multiple levels, including offloading network traffic to Wi-Fi, which helps carriers but also saves on enterprise roaming costs. Other possibilities include using "small cells" for better in-building cellular coverage, though "there is a neutral host issue here, as these are carrier-specific," Sharma says. Small cells save on device battery life, as less power is consumed, he says. Local caching of content is worth considering for media, entertainment, and other firms with similar intensive usage requirements, he says.

Define Your Mobile Scenario

From a performance standpoint, it's extremely important to define specific mobile scenarios and obtain employee feedback regarding mobile expectations to set the stage for potential network optimizations. "Many businesses attempt to block Web services like YouTube or Facebook, which are seen as bandwidth hogs," Rapoza says. "But this blocking leads to employee workarounds like jumping on other Wi-Fi networks or using their LTE connections."

Users may also jump off the network and operate outside of company control, he says. Leaders who "work with employees to set acceptable usage policies and outline proper mobile usage can go a long way toward avoiding potential performance issues," he says.

Before rolling out any project, Finneran advises conducting a trial run with limited users to gauge viability and impact on overall WLAN traffic. Because user experience is critically important and QoS gives priority to voice packets, he says, one possibility is using access controls to limit the number of simultaneous calls an access point will allow to ensure good quality. "If the AP is at capacity,

that call should be seamlessly switched to cellular," he says.

Identify Specific Issues

Specific issues IT may face include access, bandwidth, security, remote device connections, and application performance. Where access is concerned, Rapoza says with the rise of BYOD, IT must have systems in place that let users connect their own devices without posing security threats to the company. "This means using modern Wi-Fi tools that can identify, vet, and control how user devices access the network," he says.

In terms of bandwidth, Rapoza says usage policies regarding acceptable use can limit problems. Some businesses also use network application-level control systems to protect the bandwidth requirements of critical applications while limiting how much bandwidth non-essential applications can use. Finneran says QoS based on Wi-Fi Multimedia (WMM)/802.11e is also key and must be "synced to the QoS capability on the wired LAN."

An option regarding application performance, Finneran says, is using an available frequency band (2.4 or 5GHz) for voice and the other for data.

Rapoza says mobile applications should go through the same or higher level of testing, performance management, and optimization as regular applications. "The old days of blaming it on carriers or devices are gone," he says. "Mobile is where critical business is done. Our research has shown that businesses that invest in mobile-performance management have the highest level of reliability and end-user satisfaction."

Take Necessary Steps

Onboarding, or how you handle getting new users on the network, is another issue to consider, Finneran says. More broadly, enterprises should develop a well-thought-out mobility plan concerning the network that covers all aspects, he says.

Sharma says the overall aim of mobile devices is to provide employee communication, out-of-office productivity, customer engagement, and potentially mobile-to-mobile and Internet-of-things solutions.

Mobile devices are also now "media and entertainment devices with gaming, video, and other uses," he says. Thus, he advises a series of steps that includes defining a mobile policy covering security, data loss protection, content and application filtering, location-based issues, and log-in credentials.

Other steps include defining the support team's function and critical applications and how they fit into business workflows. Communications-enabled business processes (CEBP) should also be explored, Sharma says, tying in mobility, social networks, the cloud, and IT.

Enterprises should optimize CEBP solutions and then continuously repeat all steps, making adjustments. Sharma recommends hiring or developing a converged CIO/CTO and CMO position, filling it with someone who knows the business and technologies behind them. P

Monitor & Test

Monitoring and testing are vital to help prioritize the mobility issues concerning the network in a way that proves most beneficial, says Jim Rapoza, Aberdeen Group senior research analyst. "If you don't know how your mobile applications are being used, you can't set baselines or know what acceptable performance is," he says. "And with the wide variety of devices and mobile operating systems, good testing will expose potential performance issues before they affect users."

BONUS TIPS:

Review Traffic Patterns

When it comes to optimizing a network for mobility purposes, Gartner Research Director Akshay Sharma says that network managers need to be accessing and reviewing traffic patterns. This can help IT determine where a resource such as unified communications as a service (UCaaS) would make the most sense to host, whether it be via a carrier-hosted solution or hosting it in-house (typically for larger enterprises).

Envision Potential Problems

For some enterprises, it can be difficult to know exactly how to go about prioritizing the various optimizations available to them in such a way as to push those that will be most beneficial to the top of the list. One simple way to go about this, says Gartner's Sharma, is to envision that if a particular optimization weren't implemented, would problems occur?

Maintain Storage & Related Devices

Advice For Implementing Regularly Scheduled Maintenance On Storage Systems

Often, it's what we should have done but didn't that ends up haunting us. This can certainly be true in the case of data centers, where personnel might end up putting off maintenance-related tasks for various reasons only to regret doing so later. This includes tasks related to storage devices.

Even though storage devices typically do not require a great deal of upkeep, applying some basic, regularly scheduled elbow grease can prevent headaches from occurring later. Here are some tips for what you can and should do on a regular basis.

Change Your Thinking

Charles King, president and principal analyst at Pund-IT, says too many businesses treat storage systems like cars, "fixing them after they fail."

This is partially due to "the remarkable resiliency of most storage hardware solutions," he says, yet one of the best things businesses can do is institute a regular inspection/maintenance schedule with the aim of identifying and resolving minor issues that could lead to major ones. "That includes ensuring that infrastructure monitoring systems are working correctly," he says.

Mike Karp, principal analyst at Ptak/Noel, disagrees with the notion that storage systems don't require much maintenance. "Discs crash at a predictable rate, and the larger the discs, the more prone they are to crash," he says. "Storage systems need to have their components checked regularly (both discs and enclosures can provide a lot of data regarding their health) and need to be backed up religiously."

Using SSD systems can make general storage conditions substantially better, he says, but systems based on spinning discs "will be prone to mechanical failures. That is a prediction you can carve in stone, and one that can be mathematically substantiated with available data."

Greg Schulz, founder of Server and Storage IO, says two other mistakes to avoid are believing that storage maintenance only pertains to tape and not leveraging new firmware and software updates for storage systems, devices, and appliances.

Schulz also cautions against ignoring early warning signs of trouble as indicated in event logs as errors or incidents. One task that's easy to neglect, he says, is periodically reading data from disk, SSD, or tape to determine if it's still accessible and then restoring it to different systems to check that it can be read and that software tools can use it.

Monitor Performance

During the past decade, Karp says, monitoring has played an increased role in operating storage systems, as monitored data can provide a wealth of information. The information becomes even more useful, he says, "when it's considered within the general context of the other systems within the data center," including storage systems, network operations, and server monitoring.

Karp says more analytical packages are becoming available that enable managers to understand individual systems within the context of the other systems in the data center. "In other words, storage can now be seen as part of the overall IT system, and to some degree can be managed that way, allowing for proactive operational management," he says. Such ability represents a big opportunity "to

Think Logical

Server and Storage IO founder Greg Schulz says for some managers, maintenance implies only physical tasks and not logical ones. "Turns out both apply to storage systems regardless of if SSD, flash, disk, tape, or even cloud," he says.

"At a minimum, different vendors have preventive maintenance for their storage solutions that range from physically cleaning air filters or monitoring diagnostics to replacing failed or soon-to-fail components proactively."

Logical maintenance tasks include maintaining firmware, software, microcode on drives, controllers or systems, adapters, and monitoring. "Logical maintenance also means applying any other updates; monitoring configuration settings; or simply checking on health, status, performance, and event activity," he says.

finally break loose from the old 'break-fix' approach to keeping things up and running . . . and move to a more pre-emptive stance, whereby analysis of the overall IT system enables pre-emptive maintenance so that things are fixed before they break," he says.

Schulz says consistent monitoring enables establishing baselines for what's normal behavior and for detecting errors or events to determine abnormal occurrences. "Ideally, other than adding users, volumes, shares, and devices, storage should be as much hands-off as possible—set it and forget it or done via tools and plug-ins that make maintenance and upgrades, logical and physical, easier," he says. Achieving such a state will enable managers to bring maintenance back to simply cleaning, repairing, and upgrading, he says.

Tend To Tape

One rule of thumb in storage is that the more mechanical parts a system has, the more prone it is to failure. To that end, tape systems have more mechanical parts than any other system in the data center, Karp says. King adds that although simple tape products are pretty reliable, "enterprise-class solutions with robotic loading systems are highly complex mechanisms that need regular attention and adjustment."

In general, Schulz says to consider tape maintenance as being just as important as that for hard disk and solid state drives, "just on different intervals." Particularly because "tape tends to just sit," he says, tape "should be exercised a bit now and then and verified that all is good." Schulz advises taking the same approach toward disks that aren't frequently used or spun down.

Practice Real Recovery

Karp says the most neglected storage-related task is unfortunately one of the most important. "Data center managers are always trying to make sure that their disaster plans are in place and often spend a great deal of time in the design of those plans," he says. "But how often do they actually test them? In fact, testing for disaster preparedness is probably the single largest festering sore in all of data protection."

Beyond making DR testing part of the maintenance process, he says, testing should involve the entire team and not happen just when "the A-team is onsite," as "things always go wrong at the worst possible moment—when the manager is offsite, when the new kids are on the floor for the first time, and so forth." The DR testing mantra should be "do it frequently, and engage the entire team in the effort," he says.

Know The Life Cycles

Storage media needs maintenance at different times, says Server and Storage IO founder Greg Schulz, so have a planned maintenance cycle that includes verification and validation that data can be read and written.

"However, do so in a way that doesn't incur a disaster," he says. "Likewise, tape, SSDs, or HDDs will need to be replaced at some point in time, so figure out your life cycle and how you will go about addressing those while following manufacturers' recommendations for extending their life, both in terms of handling, periodic validation or use, software updates, and habitat (environmental, temperature, humidity, etc.)."

BONUS TIPS:

When To Seek Help

Ptak/Noel principal analyst Mike Karp says there are some maintenance-related situations where seeking a storage specialist can make sense, including if a broken RAID system needs repair. Server and Storage IO founder Greg Schulz, meanwhile, says to seek assistance if personnel are not comfortable applying firmware or software updates to storage systems, appliances, libraries, drives, or devices. Before doing such upgrades, he says, ensure there's a good backup and verify that it's usable, whether on SSD, HDD, tape, or the cloud.

Keep It In-House

"Given the potential impact a business risks if storage systems falter or fail, major maintenance should only be performed by trained/certified professionals, especially if a system is still under warranty," says Charles King, president and principal analyst at Pund-IT. That said, there are times when maintenance can be managed in-house, he says, including "when a company has made a significant enough investment in a particular architecture to justify the cost of keeping specialists on staff."

Evaluate The Real Costs Of Cloud Computing

Compare The Cloud To On-Premises Storage & Track Cumulative Costs Over Time

Whether you're thinking about migrating some data and applications to the cloud or you're already fully immersed in the technology, it's important to consider both the short- and long-term costs of cloud services.

Many companies think they can move data to the cloud, consolidate their data centers, and sit back while the savings accumulate. But if you aren't careful, you could end up paying more for cloud storage than if you had stored the data on-premises. We'll clear up some common misconceptions and help you determine the true costs of using the cloud.

Compare On-Premises To Cloud

If you only use on-premises storage for your data and applications, then an important first step to evaluating the costs of a move to the cloud is to determine your cumulative total cost of ownership, says John Sloan, principal consulting analyst at Info-Tech Research Group.

Sloan says that for most companies, the cost of on-premises solutions will be seen as high, because you have to buy, install, and maintain infrastructure, and the initial costs of the cloud will be low, because you simply sign up for a service and start migrating applications and data almost immediately. But for many cloud services, "those cumulative costs, especially for an ongoing application you use every day, grow at a faster rate than the onsite version," he says.

Another important consideration is for companies that already host some of their infrastructure with third-party vendors, because it may seem as though hosting provides basically the same service as the cloud.

Dave Bartoletti, senior analyst at Forrester Research, says that while both services take away your fixed capital costs and operate the cloud for you, the cloud goes one step further and only makes you pay for infrastructure when you use it. The elasticity and scalability of the cloud could save you more money than a hosted alternative, but you won't know for sure unless you perform an assessment and directly compare those costs.

Understand How Data & Applications Affect Costs

In addition to conducting assessments and comparisons, one way to control whether you save money with the cloud is to make sure you aren't paying for unnecessary capacity. Sloan says that "from a cost point of view, the cloud really shines for limited-term projects," which means that the less time that data spends in the cloud, the better. If you use the cloud for temporary rather than long-term storage, you're much more likely to cut down on overall costs.

Sloan uses the example of a New York newspaper that wanted to index all of its microfilm, with some images going as far back as the 1800s. The on-premises costs for storing all of that data to create an index would be astronomical, but the newspaper was able to use the cloud to its benefit. The company took all the images, uploaded them to server instances in the cloud, used Hadoop to analyze and build an index, and then downloaded everything.

Unfortunately for some companies, they only see that

Get Started

"The thing that we really hammer on is doing a comprehensive review of total accumulated costs over time," says John Sloan, principal consulting analyst at Info-Tech Research Group. "The shiny paper with cloud computing is that it promises to provide rapid deployment and lowered capital costs for entry. That's really the sell for the cloud. The thing is that once you start using it, incremental costs continue to add up, especially if you're using an external cloud for an application that's 24/7 and ongoing over time. Those costs continue to accumulate."

Key Points

- When comparing on-premises storage to the cloud, you need to consider both the upfront and cumulative costs.
- Most experts say you shouldn't use the cloud for storing large amounts of data over long periods of time.
- If you're interested in a private cloud, consider a hybrid approach so you can better balance your capital and operating expenses.

there were cost savings with the cloud, but not necessarily how the cloud was used sparingly to great effect.

"Those are the kinds of stories that become legendary, but the one thing about that story is that they didn't leave the stuff in the cloud," Sloan says. "They used it over the weekend, built up this huge image storage, ran the algorithm that created the index, and then took it back down again. One of the problems when it comes to putting an application that we use every day in the cloud is you're not going to have those quick savings, because it's going to stay there 24/7 from now on, and those prices are going to add up."

Private vs. Public Cloud

For security or compliance reasons, some companies can't or don't want to use the public cloud. If that's the case, consider implementing a private cloud that provides the same benefits but is hosted internally.

A private cloud can save companies money because it's possible to use virtualization and newer equipment to consolidate your data center and run many virtual machines on fewer servers. Bartoletti says if you plan to buy new infrastructure to build a private cloud, you could "bring in convergent infrastructure or cheap commodity storage and servers" to cut down on costs.

The problem with the private cloud is that you're 100% responsible for it, and regardless of how much capacity you require at a specific time, you will pay for every byte of storage even if it's not being used. You also have to buy private cloud management software to build and maintain a cloud, Bartoletti says. It's another upfront cost a vendor would provide for you in a public cloud environment.

Perhaps the best way to utilize a private cloud is in a hybrid environment. You can store sensitive information on your internal cloud but then store less mission-critical data and applications on a public cloud, with self-service access to both. With a hybrid approach, you can balance your upfront capital expenses with your long-term operational expenses to get the benefits of the cloud and the best possible cost-benefit ratio. P

Action Plan

Dave Bartoletti, senior analyst at Forrester Research, offers these steps for evaluating cloud costs:

- Perform an application assessment to pick the right apps that make sense for the cloud. Apps that fluctuate in scale or are already virtualized are good candidates for the cloud.
- What does it currently cost to deliver the infrastructure? Consider server, storage, network, data center footprint, power, cooling, and operations costs.
- If you can plan capacity needs in advance, you can save money. Make a cost-of-operations comparison between your internal costs for an app and estimated monthly cloud costs.
- Once you're using the cloud, track your costs from the beginning. There are tools that can help you do the pre-move planning and also help you optimize your cloud spend and highlight places where you're paying for instances you're not using.

Top Tips

Make costs predictable. John Sloan, principal consulting analyst at Info-Tech Research Group, says that some companies may prefer "cost smoothing or making costs more predictable over time" rather than concerning themselves with long-term costs over three to five years. It can be easier to pay a little over time than incur large upfront costs.

Look for self-service cloud benefits. If you are already working with an infrastructure hosting provider, you may want to ask the provider if it provides "a cloudier style of consumption model," says Dave Bartoletti, senior analyst at Forrester Research. With this approach, you may be able to get some of those self-service, elastic cloud benefits without investing in a new service.

Consider business continuity. Sloan and Bartoletti both say you need to think about availability, business continuity, and disaster recovery when looking at the cloud. If you need redundancy or data backups and you store them in the cloud, you could effectively double your storage and in turn double your costs.

Buying Tips:
KVMs

Although some may say that KVMs are dinosaurs from a bygone era, KVMs will continue to play a vital role in many enterprises for the foreseeable future.

"With virtualization, data center consolidation, and staff reductions, KVMs will continue to play an important role in remote management of servers (and serial devices in some cases)," says John White, KVM sales manager at Tripp Lite (773/869-1234; www.tripplite.com).

Brett Femrite, Rackmount Solutions director of business development (866/207-6631; www.rackmountsolutions.net), says KVM models include simple desktop options that control a handful of computers up to enterprise-level, IP-based KVMs with integrated matrix switching that let multiple users simultaneously access different devices. Here's what to look for.

Pick A Knowledgeable Vendor

If you don't have time learn about the offerings, consider the aptitude of the vendor you work with, says Jeff Clark, president of Lindy USA (888/865-4639; www.lindy-usa.com), and be transparent about your needs and plans. "A good KVM vendor can help place the right system in your hands, but in order to do that, you must take the time to include this vendor in the initial planning stages," Clark says.

White says a KVM manufacturer can help size the installation, review options, and offer a bill of materials.

Consider Security

Buying a KVM with secure IP remote user access is essential to reducing manpower and negating the need for onsite operation by enabling administrators to gain BIOS-level access to servers, says Anthony Yim, general manager of Austin Hughes Solutions Inc. (510/794-2888; www.austin-hughes.com). A KVM over IP switch uses an encryption protocol that will help secure the data you send over the network.

Femrite says to consider automatic time out, which disconnects users after a specified period of inactivity. Permissions-based access rights are a priority feature for data centers with multiple users accessing devices.

Check For Devices & Users

Will Beene, rack specialist and technical account manager at Rack Solutions (888/903-7225; www.racksolutions.com), says you need to know how many users can be supported both locally and remotely.

Yim says you can reduce KVM hardware expenditures and simplify management with a KVM that offers simultaneous multiuser access from different locations on devices connected to the same KVM switch.

For example, White says that the virtual media capabilities found in some KVM switches allow remote software upgrades and installations of offsite servers, negating expensive onsite personnel or third-party maintenance.

Factor In Compatibility

Be sure to account for compatibility, Femrite says. Determine the number of devices you want to connect, hardware devices you'll connect to it (mouse, keyboard, monitor), and the connection types (USB, PS/2) you need. Compatibility with the monitor you'll connect the KVM to (DVI or VGA) is also essential.

Determine The Distance

Determine the maximum distance you need to connect devices to the KVM. "If further than approximately 25 feet, you should opt for a CAT 5 cable vs. the standard KVM cable kit," Femrite says. If the servers are too far, use a KVM extender.

Yim says CAT 6 KVMs can minimize distance problems; CAT 6 cable with an interface dongle can support up to 130 feet without signal weakness.

"KVM over IP allows the servers to be further away from the KVM switch; however, Service Access Modules (SAMs) are required," Beene says. "You have to weigh the cost vs. the benefits. In large organizations with distributed systems, KVM over IP is an easy method of administration and management." P

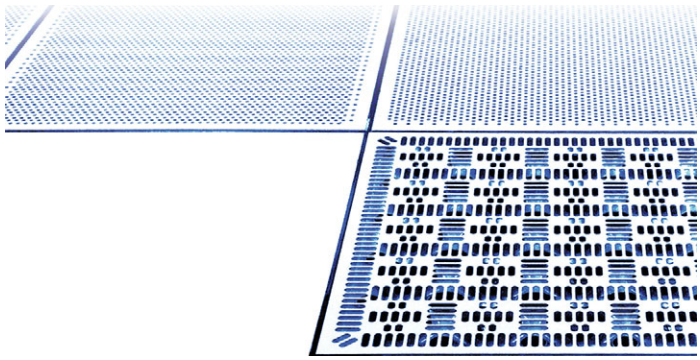
Checklist

Anthony Yim, general manager of Austin Hughes Solutions Inc. (510/794-2888; www.austin-hughes.com), offers this list of features to look for:

- Do you need traditional DB-15 cables or CAT 6 cables with an interface dongle?
- Do you need a single local console or multiple consoles with IP remote access features?
- Will the KVM be standalone or integrated with an LCD keyboard drawer?
- Will you have a single user or concurrent users?
- Does the KVM have multiplatform connectivity so you can mix legacy hardware platforms between DVI, USB, PS2, and Sun solutions?

Buying Tips:

Flooring & Accessories



Everyone knows that servers and power equipment are vital to a data center. But just as important is the flooring that holds them. Choosing the right flooring provides a stable, efficiently cooled data center. Here's what to look for.

Know The Weight

Raised floor tiles come in different weight capacities, so consider your weight-bearing requirements when selecting tiles, says Ken Koty, sales engineer at PDU Cables (866/631-4238; www.pducables.com).

The final floor has to be strong enough to support your equipment at the height of the raised floor. Also be aware of rolling load and use heavy-duty floor tiles where you will be moving equipment into and out of the data center.

Remember as rack sizes grow and densities increase, your floor tiles may need to support a greater weight than you have today. Plan ahead and install floor tiles to meet current and future needs, Koty says.

Check The Floor Finish & Material

Be careful when selecting the floor finish, Koty says. "You don't want to be constantly replacing tiles in high-traffic areas to keep the floor looking uniform."

Avoid floor tiles wrapped in galvanized metal, Koty says, as the galvanized-wrapped tiles could cause zinc whiskers over time. If you are using cement-filled tiles, use a sealant to coat any cut edges of your tiles.

You'll also need to consider static dissipation and material weight, says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net).

"Data center flooring needs to have a surface that is conducive of static dissipation," she says, to prevent the build-up of static electricity. In addition, she says, "lightweight solutions, as well as 'lay-down' panels rather than bolt-down ones, can make maintenance or swaps significantly easier."

Be Aware Of Cooling & Floor Height

If you can maximize the available space under the floor, you can increase your data center's overall cooling efficiency. As for the height of the floor, there are some general standards to follow, Koty says:

- 12 inches for less than 1,000 square feet
- 12 to 18 inches for 1,000 to 5,000 square feet
- 24 to 36 inches for 5,000 or more square feet

Koty says if you want your flooring to accommodate a hot/cold aisle configuration, make sure to plan your under-floor cable layout according to CRAC and PDU/RPP unit locations.

Cable management is also essential. "It's important to plan your under-floor power cabling layout precisely, establishing designated cable pathways," Koty says. "Making sure you purchase your power cables to the proper length will help to limit congestion and minimize air dams that can lead to cooling inefficiencies."

Check Vendor Experience

If your company doesn't have anyone on staff with experience in data center flooring, don't hesitate to rely on the expertise of a vendor. It can help you choose the right flooring and prevent the need for a potentially costly flooring replacement down the road.

Opt For Accessories

You may be tempted to cut corners to save money, but don't, Viars says. "Don't compromise on the integrity of your flooring. Make sure floor panels fit together as intended (even if it requires custom cutting/sizing), and spring for the additional airflow management accessories. It might cost a bit more upfront, but it will ensure that your cooling remains effective."

Koty says if you are planning a new raised floor construction job or a build-out, plan ahead and install brushed floor grommets as the floor tiles are being installed. "If you wait to install the grommets at the time the equipment is installed, you have fewer grommet options, plus there is the added risk of introducing contaminants into the data center." P

Checklist

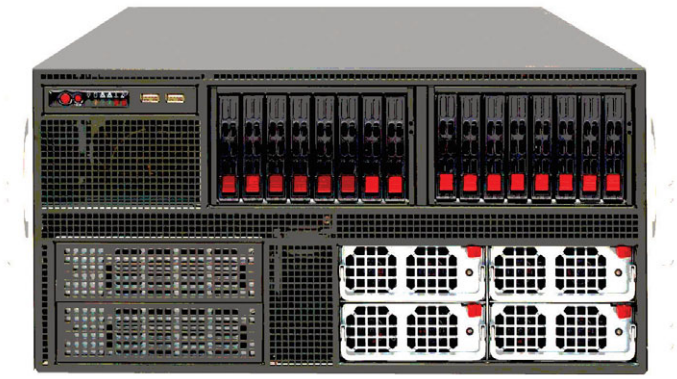
Check the fit. Do the flooring panels fit your needs and allow for effective cable management?

Account for cabling. Is there enough open space under the floor for cable routing and cooling?

Know the vendor. Does your vendor have a stellar reputation and testimonials from past clients?

Measure the load. Are all sections of the data center flooring capable of handling the weight and traffic to which they will be subjected?

Buying Tips:
Servers



When buying a new server, you have to know much more than just your enterprise's current and future needs. Budgets, compatibility, and vendor considerations also come into play.

Above all, you need to understand when it's time to buy new servers. As with any IT purchase, the goal should always be to invest in a solution that will meet performance needs for years to come.

Determine Features You Need

Charles King, president and principal analyst at Pund-IT, says CPUs, memory, and I/O are the most critical server features, though their relative importance depends on the application and workload. Companies running a business-critical database or online transaction program, for example, should eye a higher-end CPU/system than what's needed for general-purpose applications. For virtualization-related use, spend more for extra memory and I/O.

Mark Bowker, Enterprise Strategy Group senior analyst, says that too often, buyers purchase a server with more capacity than needed, which provides the comfort of extra headroom but adds expense. At the same time, though, you want to future-proof your investment as much as possible by looking for efficient, power-saving servers that can help lower energy costs in the short and long term.

"IT should understand what the latest processor chipset is on the market and what the stated road map of the chip manufacturers are," Bowker says. "This will help avoid buying into servers that are at the end of a product life cycle."

Tau Leng, Ph.D., vice president and general manager of corporate marketing and HPC solutions at Supermicro (408/503-8000; www.supermicro.com), says today's server systems are available with a variety of processor technologies and form factors. "Customers often purchase equipment that is overdesigned with unnecessary features," he says, which is why it's essential you work with an experienced and reliable partner that can offer a variety of solutions.

In addition, Leng says, adherence to standard rack unit is important to allow for easy interchange of servers. Remote management features also are critical, and power savings is becoming an important element in TCO determinations.

Consider Your Budget & The Total Cost Of Ownership

Before you get started with a server upgrade or replacement, be sure to carefully plan your budget. Don't forget that the total cost of ownership includes many different items beyond just the upfront server cost.

Possible expenditures include equipment, software licensing, labor, telco and power company services, facility improvements, vendor support, and downtime. Additional costs related to supporting a new platform can include those for power, network cabling, cooling, rack space, and management personnel, he says.

"In any infrastructure purchase, the upfront capital acquisition cost is just part of the deal. Three- to five-year total costs should be calculated, including maintenance and facilities costs," Sloan says.

Watch For Trends

Leng says one relatively new trend in servers is high-temperature free-air-cooled server environments, which can reduce electricity demand and rein in costs.

Virtualization and consolidation are also having an impact. John Sloan, lead analyst for virtualization and consolidation at Info-Tech Research Group, says it's important to know how a server will fit into a consolidated stack that includes servers, networks, and storage.

Unlike distributed models, Sloan says, "in a consolidated infrastructure, the server is a unit of hard capacity (processing and memory) that's combined with networks and storage in a resource pool that's partitioned up into virtual entities." Increasingly, he says, enterprises aren't buying servers, but blocks of capacity.

What differentiates current offerings "is how the interconnects are managed and how the whole thing is managed as one resource pool," Sloan says. Typically, blade servers are the form factor for consolidated offerings, he says. P

Checklist

Match needs, requirements. Make sure the application and workload the server will support aligns with the CPU, memory, I/O, storage, and other components you plan to purchase.

Spot upcoming trends and know how you'll use them. Virtualization, consolidation, and cloud computing are trending areas where servers are concerned. How will these trends impact your data center and the servers you purchase, both now and in the future?

Check your vendor. Ensure the vendor you plan to buy from satisfies all questions concerning support, compatibility, performance, and other issues.

Buying Tips:

DCIM Solutions

Data center managers are eyeing data center infrastructure management (DCIM) solutions for the numerous benefits they can offer by providing a holistic view of data center and facilities infrastructures. Here are some of the key elements to consider when purchasing a solution.

Know What DCIM Can Do

DCIM solutions enable IT to view real-time power and temperature usage data on a granular level and provide monitoring, management, automation, optimization, and capacity and budget planning capabilities, all of which lead to the streamlining of operations and improving energy consumption and overall efficiency. Along with that real-time, holistic view into power, cooling, and other IT and physical assets, you'll get documentation, control, visibility, and metrics tools all in one solution.

DCIM solutions can replace spreadsheets, paper records, CAD drawings, and similar tools traditionally used to track assets. You'll gain real-time, in-depth views into physical and IT assets because, with DCIM, you'll have a firm understanding of where your infrastructure assets exist and where spare capacity exists.

Other benefits include quick completion of company-required changes; the ability to receive complete capacity data for power, rack units, cooling, chassis, and network capacity consolidated into one system; less downtime; and precise views of capacity, trend, and environmental data for everyone to access.

Find The Right Product To Meet Your Needs

When comparing DCIM solutions, be sure to consider what your greatest need is and your ability to fully use the platform's tools. For example, determine whether you have the resources in place to address issues the DCIM solution uncovers and change the facility or operating procedures to enable improvements.

The maturing of the DCIM market means there are products suitable for even small enterprises. When evaluating vendors, look for ones that have forged strong links with the leading enterprise IT management vendors. In some cases, your existing power vendors may offer solutions. This would be a good starting point as you already trust them as vendors.

Greg Schulz, senior advisor at Server and StorageIO, says to pay attention to holistic DCIM solutions that expand beyond traditional facilities power, cooling, assessment, and management. Having insight on server, storage, networking, hardware, software, and services along with a facility's use and service levels enables making informed decisions on where to deploy SSD/flash, blade servers optimized for energy-efficient virtualization, and private clouds along with other popular buzzword themes, Schulz says.

Don't forget that, with whatever DCIM application you choose, you need to have the infrastructure support to run and maintain the application, says Alex North, director of business development at BayTech (800/523-2702; www.baytech.net).

Seek An Easy Migration

Rather than re-creating the wheel, seek out a DCIM solution that supports easily migrating existing data to the new system, says Brett Femrite, director of business development at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net). For example, if you're maintaining multiple spreadsheets, CAD drawings, and other diagrams, he says, "migrating that information into the DCIM solution easily will be a lifesaver."

The solution should allow data center managers to start small and work up to added levels of sophistication in phases, he says. "Flexibility can breed complexity, and while a full-featured DCIM solution can seem complicated, getting started doesn't have to be." A modular solution that enables initially buying what's needed and layering in additional features gradually is a nice benefit. P

Checklist

Plan for the future. A DCIM solution should support capacity and optimization planning, offering tools that help "determine future requirements for power, cooling, floor space, rack space, and contingency planning," says Brett Femrite, director of business development at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net).

Know what you're up against. Possible obstacles to acquiring a DCIM solution can include the company's finance department vetoing the purchase; departments having different solutions in mind, leading to paralysis; vendors not providing a solution priced for the small to midsized enterprise; lack of manpower needed to learn, implement, and oversee the solution; and poor or slow solution support. Before investing in DCIM, know how you'll handle these obstacles.

Buying Tips:

Data Center Cooling

No matter what the temperature is outside, most data centers need at least some degree of cooling year round. Having cooling equipment that can keep up with demands is essential. Here are things to keep in mind.

Know Your Options

Are you building a new data center from the floor up or upgrading a current system? Are you looking for a permanent system or a portable air conditioner for short-term needs? These are all important questions to answer.

"When purchasing cooling equipment for your data center, you'll first want to determine what your current needs are, as well as your budget," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net).

The most popular options, according to Viars, include:

Basic air-cooled systems. These systems have a traditional CRAC unit and are ideal for standard-density arrangements.

Free-air cooling systems. These systems keep operational costs down by utilizing natural (or outside) air to cool the data center. However, they are not feasible in all locations.

Liquid cooling systems. These systems are more efficient and run quieter than other systems. However, the initial price tag, as well as upkeep costs, can be high.

Portable cooling units. Otherwise known as spot coolers, these systems are ideal for affordably solving a temporary cooling concern, such as seasonal temperature fluctuations.

In addition to these options, Ken Koty, sales engineer at PDU Cables (866/631-4238; www.pducables.com), says you need to determine whether you'll be using computer room air conditioners (CRACs), which have self-contained compressors and require condenser water, or large central chillers that require computer room air handler (CRAH) units. "The different types of units have different needs and require different types of maintenance," he says.

Size The System

To understand how much cooling capacity you require, calculate the load that needs cooling and total tons of cooling, accounting for future growth, Koty says.

Determine how much heat your system will generate, Viars says, which includes not only the IT load, but also the power systems, lighting equipment, and the people working within the data center.

"Once that data has been collected and compiled, that number will need to be inflated to account for redundancy, the effects of humidification, and future growth of the data center," she says. "You do want to make sure that you have the required capacity available for growth and redundancy."

Koty says it's equally important to know the sensible and latent capacity the equipment will produce; manufacturers should provide documentation for these capacities.

Don't be surprised if you find your data center already has adequate cooling capacity for the equipment on the floor, Koty says. "A lot of data centers are designed with excess cooling capacity. Unfortunately, the excess capacity masks other cooling efficiency issues like airflow bypass, recirculation, and air stratification," he says. "As long as these other cooling inefficiencies exist, excessive energy consumption will continue."

Other Factors To Consider

Don't overlook details when comparing air-conditioning systems. Koty says to look for controls that can be monitored remotely and the ability to lock the control panel to prevent unauthorized personnel from changing temperature and humidity settings.

Koty says other important features include internal smoke detectors and liquid detectors that can be monitored remotely. Also consider maintenance. You should have easy access to perform tasks such as changing filters, cleaning coils, and replacing compressors and belts. P

Checklist

Calculate your load. A good place to start is by calculating how many BTUs you need to keep your equipment at the appropriate temperature. Be sure to account for heat load and future growth.

Consider airflow. "A great deal of money is thrown away on cold air that just doesn't reach the equipment," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net).

Know how many units you need. You shouldn't only buy enough units to handle your current load. Ken Koty, sales engineer at PDU Cables (866/631-4238; www.pducables.com), says you need to account for future growth and the failure of a unit or the need to shut down a system for proper maintenance. The total CFM output of your units can also impact how many units you need, he says.

Buying Tips:

Data Center Furniture

In a high-duty area like an enterprise or data center, you need furniture that's both functional and durable. Here's what to keep in mind as you're comparing options.

Know Your Company

Your company's needs define the furniture you buy. "Some companies need conference room furniture for secure and private consultations, and others, such as network centers, might utilize server cabinets or colocation cabinets and racks," says Susan Wynne, senior sourcing specialist at Rackmount Solutions (866/207-6631; www.rackmountsolutions.net).

Make Sure It Fits The Space

Have a plan, Wynne says. "Know the function of the room. Have in mind a design or layout of the space you're wanting to create. A sketch or draft of the room with the various components in place is helpful."

Know the dimensions of the space and furniture. Also helpful is knowing how a workstation will be used and by how many people to ensure comfort. Be sure to note whether the surface of the furniture has a lip that makes it wider at the top than at the bottom, and don't forget to leave space for drawers to pull out in cabinets or for people to work in front of the furniture.

Marking the space with tape can show you how much space the furniture takes up as well as what kind of walking space will be left over once it's there. If you prefer not to do it yourself, many furniture vendors offer design templates or free space planning.

Research Available Vendors

A solid data center furniture vendor will have a long track record of providing high-quality products and services. That ensures you can view it as a partner and work with the company for years to come.

"You want a vendor that you can invest in for the future," says Eli Hertz, CEO and president of Hergo (888/222-7270; www.hergo.com). "You don't want to deal with a company that will only be around for a one-time purchase."

Check For Quality

Once your budget is established, you can get the best value for the dollars you spend by looking for the best materials for your price range.

For example, the frame makes a big difference in a piece of furniture's durability. Especially for desks, a steel frame with cross supports is going to be the most durable model. As for surfaces, high-density laminate and high-density pressboard are good choices. Wynne recommends spending more money upfront on quality products from a long-standing vendor.

Use Your Space Efficiently

One way to use space more efficiently is to go vertical rather than horizontal, possibly by investing in pieces of furniture that are wall-mountable. "Office and lab space is at a premium," says Kristen Speranza-Diamond, vice president at Hergo. "It's beneficial to go vertical and make the best use of square footage."

Speranza-Diamond says that most necessary pieces of furniture and equipment for data centers are becoming less expensive, "so everyone is upgrading and making the transition to go compact." Manufacturers are putting more advanced technology into smaller packages, which will help you put more equipment into each piece of furniture.

Focus On The Future

Be sure to look for key features, such as height adjustment for chairs or cable management systems for racks. If you invest in modular furniture with swappable pieces, you'll have room for future growth, Wynne says.

Choose furniture that will have a long life span. "You have to know that your current furniture will still be available in six or 12 months should you wish to duplicate or expand," Wynne says. P

Checklist

Seek out quality. Although looking for deals can help companies on a tight budget, sacrificing quality as a result can end up costing more in the long term, especially if buying from vendors that don't offer lifetime warranties on furniture.

Know the delivery terms. Determine if the delivery includes bringing it inside the facility, requires a lift gate or loading dock, and includes assembly or puts the responsibility on you or a third-party installer.

Go modular when possible. Buying components that are interchangeable lets you modify the setup to meet changing needs, including downsizing or expanding space. Increasingly, individual furniture units can be mixed and matched and layout configurations easily altered.

Build vertically. Purchase components that support building vertically for better space efficiency.

Network With Your Peers At These IT Training & Association Meetings Across The United States

OCTOBER

AITP Long Island NY IT Security - Impact on Business Initiatives

Oct. 22, 12 to 2 p.m.
University Club, Hofstra University
Hempstead, N.Y.
www.AITP-LI.org

AITP California Southland

Oct. 23
Garden Grove, Calif.
www.aitpcalsouthland.org

ISSA Baltimore

Oct. 23
Concurrent Technologies Corp.
8530 Corridor Road
Savage, Md.
www.issa-balt.org

AITP Region 18 IT CON

Oct. 26
Doubletree Hotel
340 Racetrack Road
Washington, Pa.
www.aitp-region18.org

DevOps Live

Oct. 26, 8:10 a.m.
Alamo Drafthouse Cinema, DFW
100 South Expressway
Richardson, Texas
www.devopslive.org

AITP Akron 60th Anniversary Meeting

Oct. 29
6 to 9 p.m.
Holiday Inn Akron West
4073 Medina Road
Akron, Ohio
www.akron-aitp.org

ISSA Inland Empire

Oct. 29
11:30 a.m. to 1:30 p.m.
Upland, Calif.
ie.issa.org

ISSA Of Orange County 28th Annual ISSA SoCal Security Symposium

Oct. 30
Long Beach Hyatt Regency
200 S. Pine Ave.
Long Beach, Calif.
www.issa-oc.org/Symposium2013.html

NOVEMBER

Cisco CCN Certification Training Course

Nov. 4
Institute of Professional Learning
500 W. Cypress Creek Road
Ft. Lauderdale, Fla.
www.iplearning.net

AFCOM North Carolina

Nov. 12
8:30 a.m. to 4:30 p.m.
Marriott at Research Triangle Park
4700 Guardian Drive
Durham, N.C.
www.afcomnc.org

AITP Richmond

Nov. 12
Hilton Garden Inn at Innsbrook
4050 Cox Road
Glen Allen, Va.
www.aitprich.org

Android DevCon Fall

Nov. 12-15
Boston, Mass.
www.andevcon.com

AITP Wheeling
Nov. 13
White Palace at Wheeling Park
1801 National Road
Wheeling, W.Va.
www.aitp-wheeling.org

AITP Washington, D.C.
Nov. 14
Alfio's La Trattorio Restaurant
4515 Willard Ave.
Chevy Chase, Md.
www.aitpdc.org

ISSA Of Orange County
Nov. 14, 12 to 1:30 p.m.
Dave & Busters
Irvine, Calif.
www.issa-oc.org

AITP Long Island NY Annual Technology Showcase
Nov. 19, 11 a.m. to 3 p.m.
The Hilton Long Island/Huntington
598 Broad Hollow Road
Melville, N.Y.
www.AITP-LI.org

AITP Southwest Missouri
Nov. 19
High Street Baptist Church
900 N. Eastgate Ave.
Springfield, Mo.
aitpspringfield.org/main.html

DevOps Live
Nov. 19, 6 p.m.
Paladin Consulting Inc.
3030 Lyndon B Johnson Freeway
Dallas, Texas
www.devopslive.org

AFCOM Greater Tampa Bay Chapter
Nov. 20
12:30 to 4 p.m.
www.tampabayafcom.com

AITP Northeastern Wisconsin
Nov. 20
Holiday Inn Appleton
105 S. Nicolet Road
Appleton, Wis.
new.aitp.org/eventsmeeting-info

AITP San Antonio Chapter
Nov. 20
San Antonio, Texas
www.aitp.org/group/174

AITP Twin City
Nov. 21, 7 p.m.
Ozark House Restaurant
704 McGregor St.
Bloomington, Ill.
www.aitp.org/members/group_content_view.asp?group=75779&id=125369

ISSA Inland Empire
Nov. 22, 6 to 9 p.m.
Upland, Calif.
ie.issa.org

AITP California Southland
Nov. 27
Garden Grove, Calif.
www.aitpcalsouthland.org

ISSA Baltimore
Nov. 27
Concurrent Technologies Corp.
8530 Corridor Road
Savage, Md.
www.issa-balt.org

Do you have an event you'd like to see listed?
Send an email to feedback@processor.com.

PROCESSOR Solutions Directory

Here are brief snapshots of several companies offering products designed for the data center and IT industry. Listings are sorted by category, making it easy for you to find and compare companies offering the products and services you need.

You can find more detailed information on these companies and the products they offer inside this issue.

To list your company and products, call (800) 247-4880.

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(800) 672-7244 | www.hmcragg.com

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Products Sold:

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- PDUs
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(773) 869-1234 | www.tripplite.com

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- Shockmount shipping cases
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(800) 555-7176 | Cablesys.com/pro

Physical Infrastructure

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AVTECH Software, founded in 1988, is focused on making the monitoring and management of systems, servers, networks, and data center environments easier. AVTECH provides powerful, easy-to-use software and hardware that saves organizations time and money while improving operational efficiency and preparedness. AVTECH products use advanced alerting technologies to communicate critical status information and can perform automatic corrective actions.

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ITWatchDogs

ITWatchDogs manufactures environmental monitors that help prevent downtime from climate- and power-related issues. Its Web-enabled monitors let users keep an eye on remote conditions from a secure Web interface and receive SNMP, email, SMS, and voice call alerts when specified alarm thresholds are exceeded for external factors, including temperature, humidity, airflow, power failure, smoke, water detection, and more.

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Physical Infrastructure

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(800) 835-1515 I www.servertech.com

Physical Infrastructure

BayTech was founded in 1976 and, since the 1990s, has developed unique products for remote power management. The company uses printed circuit board instead of wires for a better, more resilient connection between the data center equipment and the receptacle. BayTech provides an extensive Web site with brochure downloads, warranty information, and reseller support and also offers evaluation units for data centers.

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Physical Infrastructure

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Physical Infrastructure

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(877) 373-2700 | www.sensaphone.com

Physical Infrastructure

PDUsDirect.com is a Master Distributor of select Server Technology PDUs for server and networked environments. PDUs Direct's basic, metered, and switched Rack PDUs provide local and remote power management, power monitoring, and environmental monitoring. We pride ourselves in offering industrial-grade quality products at the lowest prices, with the fastest shipping (most orders shipped within 24 hours) and simplest purchase process. We are the Power Behind the Business.

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Physical Infrastructure

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